JANUARY 1956

PLANT MAINTENANCE

How to Tell How Well You're Doing

P. 81

FACTORY

MANAGEMENT AND MAINTENANCE

A McGRAW-HILL PUBLICATION
FIFTY CENTS

MATERIALS HANDLING

Heavy Moving Goes Automatic

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Top Electrical Maintenance

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QUALITY CONTROL

New Bonus for Better Quality

P.

COST DIGEST

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ON PAGE 135

$500,000 skyrocket!

An exploding 2000-barrel asphalt tank booms skyward, showering flaming asphalt on adjacent tanks, to devastate this storage area. Once fire has gained such headway, it becomes extremely difficult to control.

But there is a time when practically any fire can be controlled — and kept from turning into a disaster. That moment is at the very start — and the way to do it is with a Grinnell Fire Protection System.

Grinnell has spent more than three-quarters of a century building and installing reliable fire protection systems. Today Grinnell can offer you a system for every need. If you face a fire problem, call on Grinnell. Grinnell engineers are trained to evaluate your property and advise on the proper system for you. With a full range of equipment, you are assured of unbiased recommendations which will be fitted to your needs. Grinnell Company, Inc., 262 West Exchange St., Providence, R. I.

There's a* GRINNELL *Fire Protection System for every fire hazard

- **Automatic spray sprinklers** — wet pipe, dry pipe and Simplex systems
- **Deluge spray sprinklers—rate-of-rise detection** —Multitrol wet or dry pipe systems
- **Emulsion and vapor dilution extinguishment** — Mulsifyre and ProtectoSpray systems
- **Water spray for cooling, insulation, and controlled burning** — ProtectoSpray systems
- **Air foam blanket** — ProtectoFoam systems
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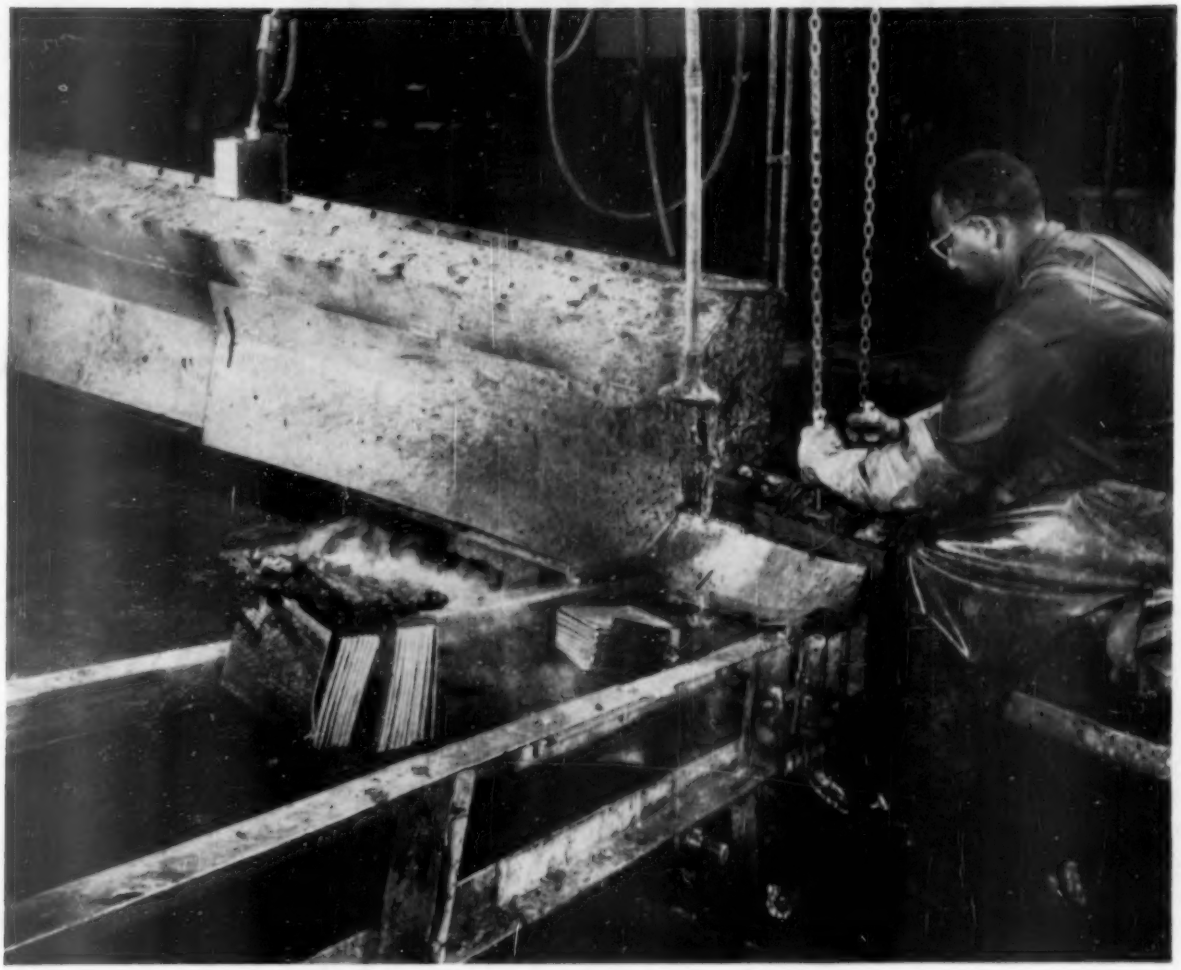
- **Dry chemical systems**

GRINNELL

Manufacturing, Engineering, and Installation of Fire Protection Systems Since 1870

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Hot lead rides rubber, drenched in acid, tar, water

A typical example of B. F. Goodrich improvement in rubber

THAT's the way they salvage old automobile batteries. High heat softens the outer case and tar so the lead plates can be taken out, melted down and used again. But how carry anything through the salvage plant, dripping with sulphuric acid, hot tar and water?

A conveyor belt was tried, but burned out in a few months. Other belts, specially designed for hot materials, averaged only 6 to 8 months. Then the company tried a B. F. Goodrich *cord* belt. It's made with cords, running lengthwise, held in place by a new, heat-resisting rubber.

This improved B. F. Goodrich belt is what you see in the picture. It has already outlasted—by 50%—any other belt ever used here. And it's still in such good condition, engineers predict it will give several years more service.

Besides standing higher temperatures, the cord belt can take crashing blows that would cut, gouge and break an ordinary belt. And if an accident should cause a cover cut, there are no cross threads to spread acid that would weaken or rot the belt. The rubber surrounding each cord restricts moisture to the cut spot.

B. F. Goodrich engineers are constantly finding ways to make rubber products save money for users—either by doing a job other rubber can't do, or by lasting longer, or by replacing other more expensive materials. Your B. F. Goodrich distributor can show you, right in your own plant, where these improvements can cut your operating costs. Call him when you need rubber. *The B. F. Goodrich Company, Dept. M-528, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

FACTORY | Reader's

MANAGEMENT AND MAINTENANCE

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THE MAGAZINE OF PLANT MANAGEMENT FOR 65 YEARS

A McGRAW-HILL PUBLICATION

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FACTORY MANAGEMENT AND MAINTENANCE
JANUARY 1956 Vol. 114, No. 1

Consolidation of Factory and Industrial Management, including Factory, and Maintenance Engineering. Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder. Executive, Editorial, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi,

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FACTORY | LETTERS

COLOR CODES

Sir:

I wonder if you could tell me where I might get hold of a standard color code for marking various types of supply and drain lines for steam, water, air, power, and such other services as are commonly found in metal manufacturing plants. We are about to build a new plant and would like very much to follow a nationally accepted code in marking the lines.

C. van Mook
Assistant Plant Engineer
Teleflex, Inc.
North Wales, Pa.

► **Standards for color identification of piping systems from American Standard Association, 70 East 45th St., New York 17. Ask for Standard No. A13-1928. Price: 60¢. Some plants paint entire lengths of pipe. Others apply the code every 10 to 20 feet. You can use paint or colored plastic markers.—ED.**

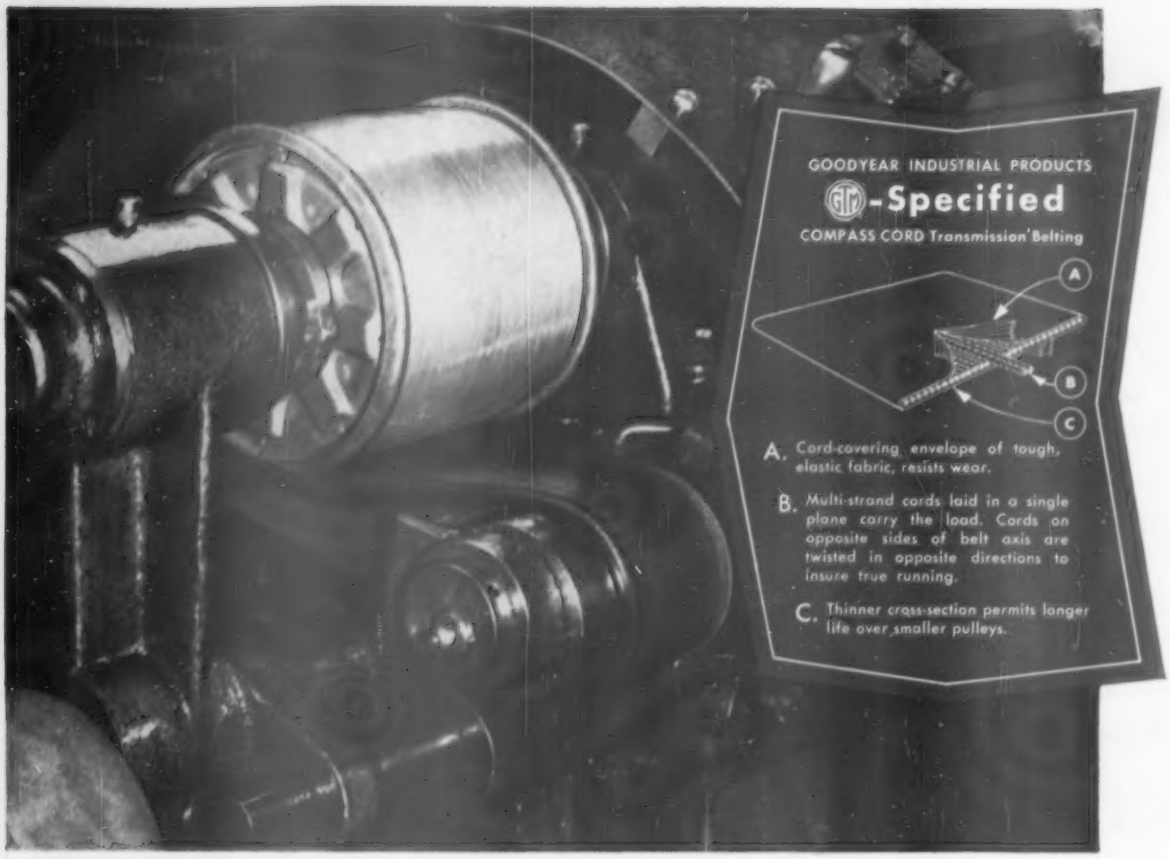
COLD FACTS ON SUMMER HEAT

Sir:

"Beat Summer Heat Now" (FACTORY, June 1955, p. 102) has been the topic of much discussion in our local group of management and production engineers. The 26 ways to beat heat and humidity . . . have resulted in some changes in local plants that have shown marked improvement in working conditions.

Way No. 19 was the only one of the 26 we disagreed on. A roof pond is not very effective because it *holds* heat. Better results are obtained where only enough water is applied to keep

Turn to page 8


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
COMPASS CORD Transmission Belting
A
B
C
A. Cord-covering envelope of tough, elastic fabric, resists wear.
B. Multi-strand cords laid in a single plane carry the load. Cords on opposite sides of belt axis are twisted in opposite directions to insure true running.
C. Thinner cross-section permits longer life over smaller pulleys.

1200% more life

from wire-winding belts

ONCE steel wire is drawn, it must be wound on spools. This is done on special machines with the help of short, endless belts.

Previously used belts lasted only six weeks. Excessive oil, severe abrasion, short centers and high speed were the reasons for such short life. The G.T.M.—Goodyear Technical Man—was consulted. He suggested COMPASS CORD Transmission Belts (see blueprint) with oil-resistant top covers.

RESULT: These endless cord belts *cost less than half* of those formerly used—*last an average of 18 months*—cut down-time and maintenance costs inestimably.

How can the G.T.M. and COMPASS CORD Transmission Belts cut your drive costs? Find out by contacting him, your Goodyear Distributor or writing Goodyear, Industrial Products Division, Akron 16, Ohio.

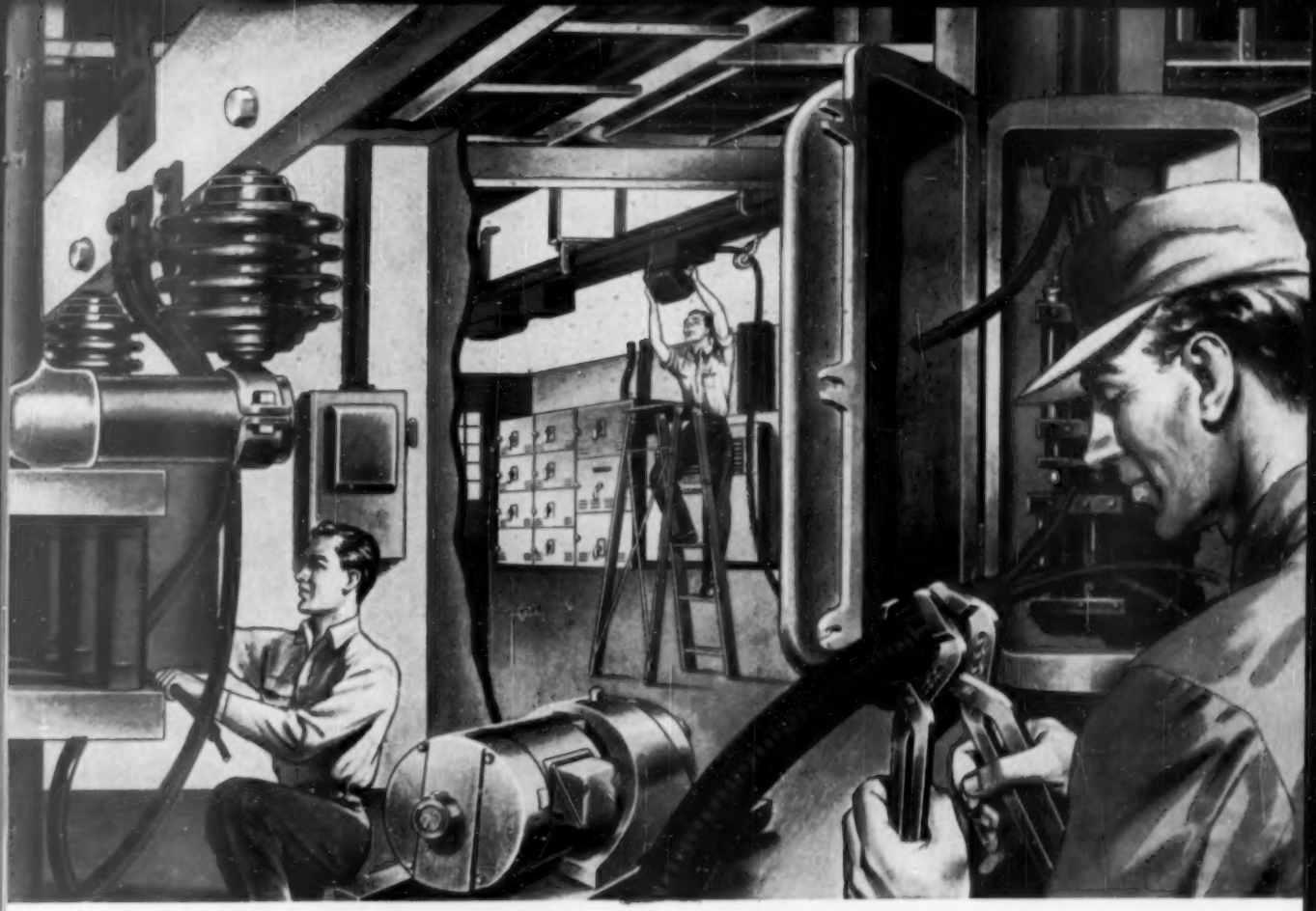
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

COMPASS CORD TRANSMISSION BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



Power distribution systems that can effectively handle future demands are the surest way to avoid electrical obsolescence and costly rewiring.

Local Graybar Representatives will work with you or your electrical contractor in the selection of wiring and equipment to meet today's needs . . . and tomorrow's.

"Plan in" future plant flexibility . . . today

FREE booklet tells how BUStribution provides for today and tomorrow

Bulldog BUStribution is today's most efficient, most modern electrical distribution system. It provides the utmost in plant layout flexibility: 1. Allows simple easy changes as machinery is moved about. 2. Will meet demands of newly installed, high production, automatic machinery. BUStribution flexibility and economy are fully explained in this illustrated booklet. Write Graybar. Request Bulletin BD-750.

Planning extra power capacities for future expansion is an important consideration in new plant construction. Today's pressure of electrical growth often outstrips power-carrying capacity long before the equipment itself becomes outmoded. This then, is the most important reason why it pays to call Graybar *first* on any wiring project. A Graybar Inside Construction Specialist can not only help you determine a power-distribution system to satisfy present and near-future needs, but also to "plan in" flexibility for long range expansion.

Over 100,000 different electrical items are distributed by Graybar through its nation-wide system of offices and warehouses. Complete catalog and quotation service covering them is available to help you work out job costs and specifications — for lighting, power, control, ventilation, communications, as well as wiring. 464-111

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420 Lexington Ave., New York 17, N. Y.

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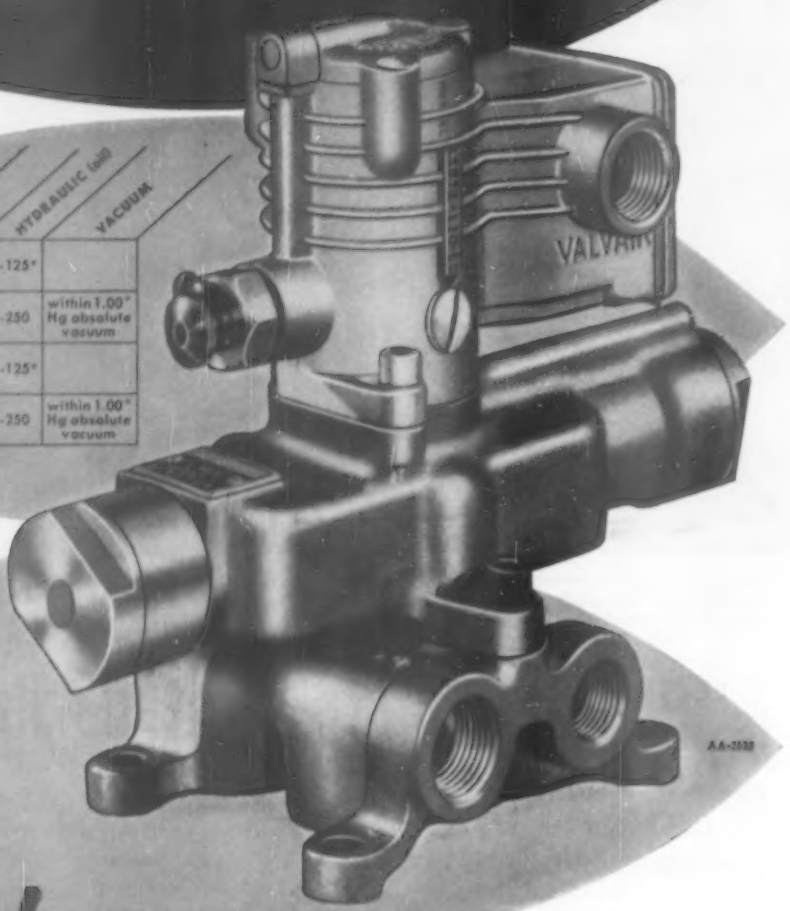
LONGER LIFE...NO COIL BURNOUT

with **SPEED KING**

The valve that likes to be compared



PRESSURE RANGES PSI	AIR	HYDRAULIC (oil)	VACUUM
Single Solenoid (internal pilot supply)	35-200	35-125*	
Single Solenoid (external pilot supply)	0-250	0-250	within 1.00" Hg absolute vacuum
Double Solenoid (internal pilot supply)	35-200	35-125*	
Double Solenoid (external pilot supply)	0-250	0-250	within 1.00" Hg absolute vacuum

Single solenoid Speed King shown. Single and double solenoid types in ⅛, ¼, ½, ¾ and 1" pipe sizes with foot or sub-base mounting. All air valves bubble-tested under water.
***Water pressure range 50-125 psi**

Write for free copy of Bulletin A-12

See us at the
ASTE Show
Chicago International Amphitheater,
MARCH 19-23
Space No. 130

Valvair

Compare the Speed King—by Valvair—with *any* valve. Check its design, features, materials of construction, and workmanship.

Be critical—check *performance*. For that's where the Speed King really scores. Up to 600 cycles per minute. And users report Speed Kings are still delivering satisfactory performance after 20 *million* cycles. What's more, Speed Kings are guaranteed against coil burnout for the life of the valve.

No matter what your requirements in air, hydraulic or vacuum control valves . . . compare and you'll specify Speed Kings—by Valvair. They perform better *longer*. Futhermore, immediate deliveries can be made from stock. Valvair Corporation, 454 Morgan Avenue, Akron 11, Ohio.

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Why, in one year, 73 companies paid 28% more for this Baker Gas Truck

The Baker Gas-O-Matic introduces a revolutionary new concept in automatic transmissions for gas-powered fork lift trucks. Instead of a torque converter, it employs a variable voltage generator—integral with the gasoline engine—and an electric motor.

The initial cost of this truck is about 28% higher than conventional clutch-type gas fork trucks. But . . . operating and maintenance costs are extremely low—in line with the higher priced battery-powered electrics. Moreover, frame, uprights, steering assembly, drive axle, etc.—in fact 90% of Gas-O-Matic's components—are standard Baker electric truck parts which always last 10 years or more.

Gas-O-Matic users have proven that

1. Fuel savings, originally estimated by our engineers as 40%, are actually in excess of 50% over ordinary gas trucks.
2. Depreciation costs are less because truck can be amortized over 9 years instead of 5.
3. Maintenance costs are less—no clutch or transmission to wear out and replace—30% fewer moving parts—no complicated electrical system—engine operates at controlled optimum RPM.

These Gas-O-Matic customers recognize the "lower-first-cost" fallacy—many of them have re-ordered for the second and third time—based on their experience with these trucks.

Write for complete information about this unusual fork lift truck.

Baker handling equipment

THE BAKER-RAULANG COMPANY

1218 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

BGE2

JOT NAME, TITLE AND ADDRESS IN THIS SPACE
TO START YOUR FREE "NELWELDER" SUBSCRIPTION

Complete photo of the muscle man appears on the front cover of the February "NELWELDER", industry's magazine of stud welding.
NELWELD

one sure way of proving...

NELSON STUDS STAY PUT!

Test it yourself . . . apply brute strength to an end-welded NELSON stud, and you'll destroy the stud before the weld gives way . . . it stands up under shock, impact, vibration and tension. Further proof of strength is the increasing number of engineers and architects who are putting NELSON studs up to 1⅛-inch diameter to work in heavyweight jobs. How they are used to fasten better at less cost is revealed monthly in the "NELWELDER", the magazine of stud welding. To start your free subscription, mail us the top of this advertisement.

NELSON STUD WELDING
Division of Gregory Industries, Inc.
LORAIN, OHIO

the roof moist. And best results are obtained in areas where low humidity speeds evaporation. We also found that white marble chip roofs are not an altogether effective reflective surface. The chips contain re-entrant angles that absorb some solar energy. Besides, they're dusty and therefore don't bond at all well to roofing tar.

Way No. 18 (reflective roof surfaces) we found most economical and effective . . . We have used a water-base white roof coating. It has reduced roof and interior temperatures substantially.

J. M. Terrill

Route 7
Johnson City, Tenn.

► **You're right. We should have said "roof sprays."—ED.**

MORE ABOUT THE FLOODS

Sir:

Congratulations on your emergency bulletin, "What to Do After the Flood" (August 25, 1955). We hope you will accept the following as constructive criticism.

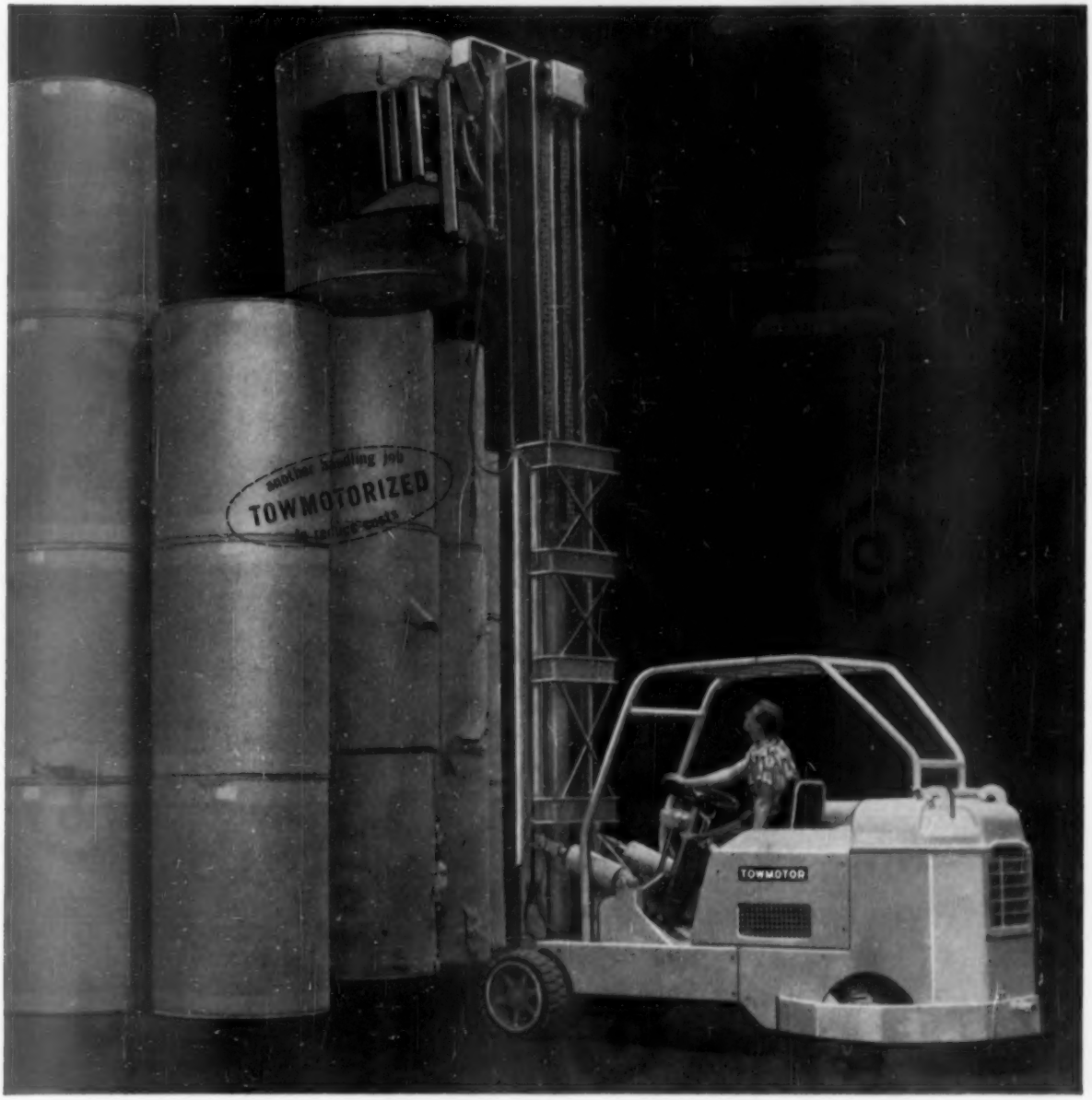
We feel strongly that suggesting the use of carbon tetrachloride as a cleaning medium is a disservice to industry rather than a service. This product is mentioned throughout your booklet and we would like to call your attention to the toxic hazard of carbon tet.

There are many good companies in this field, besides ourselves, that manufacture, blend, and sell replacements for this item. We are not seeking publicity for our materials . . . but we do feel an obligation in view of our company's policy of promoting safety, to advise you of this situation and ask that you give serious consideration to outlawing carbon tet as a cleaning medium.

P. F. Rose

The Penetone Co.
Tenafly, N. J.

► **You're right about toxic hazards. Since most of our staff members have had considerable plant operating experience, we are aware of the problem. But we think you will see many instances throughout the bul-**



Towmotor with upending roll clamp accessory, stacks 7000 pound liner board roll 17 feet high.

TOWMOTOR makes new plant really modern!

It's not so ridiculous as it might sound! No plant—new or not so new—is truly modern unless materials are "mass handled" the Towmotor way. You can eliminate wasted time and inefficiency in every phase of your manufacturing, receiving, storage, processing and shipping. The savings made with Towmotor are immediate and substantial. You can apply them to your own business. Write for a Towmotor Certified Job Study on your own industry. TOWMOTOR CORPORATION, Div. 501, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS
and TRACTORS SINCE 1919

TOWMOTORS are made only by TOWMOTOR CORPORATION

"How we beat gas restrictions with Janitrol Unit Heaters"

AT Huttig SASH & DOOR CO.

"Our Janitrol equipment gives us efficient gas heat, regardless of location."

SAYS...

Mr. F. W. Stewart
Vice President-Treasurer

"Every post-war plant—in Dallas, Charlotte, and St. Louis—is heated by gas-fired Janitrol unit heaters. They were recommended by our engineers. Our Janitrols have operated economically and efficiently," reports Mr. Stewart.

"Also, in areas with gas restrictions, we've found that Janitrol units operate with equal efficiency on our supply of stand-by LP-gas when natural gas is temporarily curtailed."

Change-over is made at a moment's notice by the operation of only two levers. This all-gas system saves considerably over other dual fuel types both in operation and original cost. Where natural gas is not available, straight L-P or "tank" gas is often very practicable.

Photographs show Huttig's new St. Louis plant, one of several with office and production areas heated by gas-fired Janitrol Unit Heaters.

Janitrol
GAS-FIRED UNIT HEATERS

For more information on the use of unit heaters in many types of new or remodeled buildings, write for your copy of "Businessman's Blue Book of Better Heating".

Janitrol Heating & Air Conditioning Division
Surface Combustion Corporation, Columbus 16, Ohio
In Canada: Alvar Simpson Ltd., Toronto 13

ALSO MAKERS OF Surface INDUSTRIAL FURNACES AND Kathabar HUMIDITY CONDITIONING

Begins on page 3

letin where we carefully specified cleaning agents other than carbon tet. If we had our bulletin to do over—and if we had plenty of time—we'd modify our few references to carbon tet. But speed—rather than exact phraseology and detailed editing—was our prime consideration for the plant men who needed help—right then.—ED.

HELP ON LAYOUT

Sir:

If we submitted an approximate plan of our proposed factory and gave you a list of the machinery we have and expect to get in the near future, could you lay out these machines for us so that we could get the most even flow of production?

Arnold Robins
Ro-El Furniture Manufacturing Co.
L'Abord-a-Plouffe, Que.
Canada

► **Enclosed: Two tear sheets and a reprint related to furniture-plant layout, plus indexes of FACTORY for the past two years. And we suggest two books: (1) Practical Plant Layout, by Richard Muther, McGraw-Hill Book Company, $12; and (2) Plant Layout Planning and Practice, by Mallick and Gaudreau, John Wiley & Sons, Inc., $7.50. As for your suggestion that we provide a layout based on data you might submit, we regret we cannot provide such a service. We suggest an able consultant.—ED.**

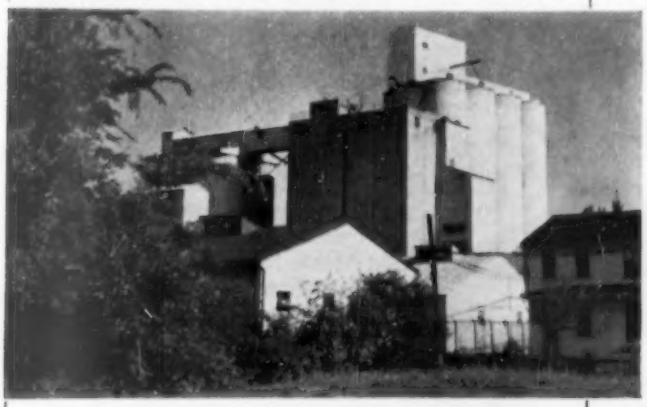
PROFITABILITY INDEX

Sir:

I read with great interest "Newest Way to Figure Machine Payoff" (FACTORY, October 1955, p. 92). Considering the scope of the subject, it is an excellent presentation in the space allotted . . .

Before discussing specific points, it should be said that many methods of equipment replacement analysis incorporate present-worth or annuity mathematics . . . Point is that the various methods emphasize different factors in the same equation (time span, interest rate, money val-

These **"Rooftop"** Armco Buildings solved special problems for industry

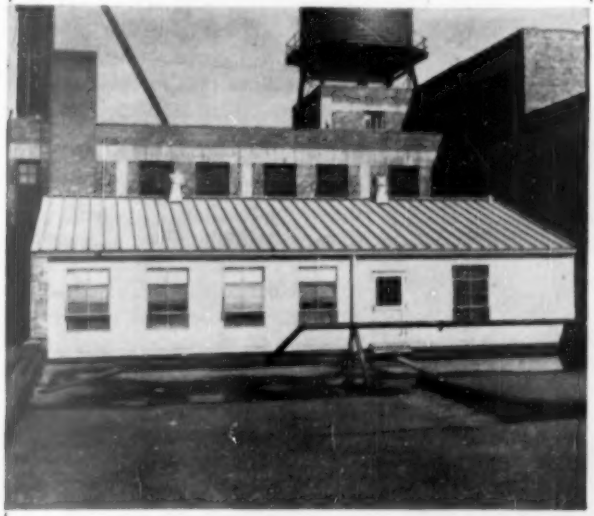


The 746-square-foot Armco Building atop the grain bins was erected to house conveyor machinery and equipment. Standard Armco Buildings are easily adapted to many types of foundation, both on the ground and "in the air" like this one. The installation is at the Highspire, Pennsylvania, granary of the Wheatena Corporation.

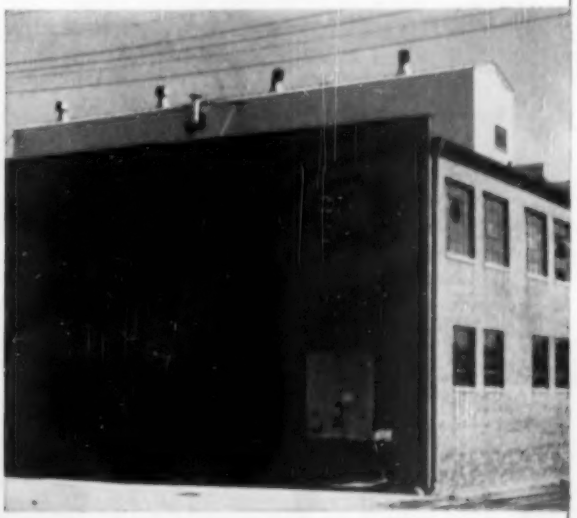
Normally, Armco Steel Buildings are erected on solid ground. But here are three industrial space problems that were solved by erecting Armco Steel Buildings on top of existing structures. Simplicity of design and construction, high strength and light weight made Armco Buildings the logical answer.

Write for information on how Armco Steel Buildings can meet your specific needs—economically and efficiently. Armco Drainage & Metal Products, Inc., 3126 Curtis St., Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO Steel Buildings



When additional office space was needed by a large utility company, this 1,800-square-foot Armco Steel Building was selected. Added weight on the original structure was minimized. The wide range of standard sizes made it easy to get the space they needed.



A new heat oven was too high for the New Monarch and Stamping Company's plant at Des Moines, Iowa. Adding an extra floor would have been costly. The economical solution was a 12-ft. high Armco Steel Building installed on the roof, over the new oven.

NEW

Ramset®

EXCLUSIVE

DUO-JOBMASTER

INTERCHANGEABLE

on the job

Just twist — unscrew; that's all you do!

Here's the answer to maximum versatility in powder-actuated tools—TWO TOOLS IN ONE, with both ¼" and ⅜" barrels, interchangeable on the job. Operator carries with him the tool, extra barrel, fasteners and charges . . . sets ¼" and ⅜" studs *with the same tool* merely by switching barrels.

Changing barrels is simplicity itself . . . just release with a wrench, then a twist of the wrist takes out one barrel and puts in the other. Barrel not much bigger than a fountain pen.

This is the time-proved, job-proved RAMSET® JOBMASTER with this new added convenience. Still FIRST in powder-actuated fastening — imitated but never equaled.

Write for new catalog which shows complete line of RAMSET fasteners, tools and charges. Sent free.

Ramset Fastening System

WINCHESTER-WESTERN DIVISION

OLIN MATHIESON CHEMICAL CORPORATION

FIRST IN POWDER-ACTUATED FASTENING

12155 BEREA ROAD • CLEVELAND 11, OHIO

Begins on page 3

ue). Real clue to usability is the way these factors are emphasized.

Mr. Ruel's method is basically sound, as it incorporates the present-worth technique. But I take exception to four of his points:

1. I can see that present worth is perhaps more applicable to the industry he represents, since it is not always possible to use annual averages accurately for chemical equipment. Some sacrifice of simplicity is made, however, and I strongly believe that, for shop equipment replacement in general, an annuity approach is within the acceptable range of accuracy.

2. The use of return-on-investment percentages for comparison is meaningless unless we know the service lives as well as length of utilization of equipment. I believe it is better to shoot for a target return on investment for replacements in general, and focus attention on the capital return period in relation to potential utilization and the net savings over projected service lives. This places the emphasis where it should be. Replacements can be compared on the basis of net savings after return on investment and amortization are considered. It also sets up a return-on-investment goal that the organization can aim for.

3. I do not agree with showing tax effect as an across-the-board technique. This is a more proper matter for capital budgeting and involves more than a cut-and-dried percentage tax value. The analysis should merely come up with comparative advantages of alternatives. We can eliminate taxes at this point without destroying the value of the analysis. The decision should first be made on the basis of good engineering and business judgment, and the tax effect brought to bear subsequently, where its full implications can be analyzed.

4. I do not believe Mr. Reul considers projected repair costs.

Philip A. Scheuble, Jr.
Asst. to Vice President—Mfg.
A. O. Smith Corp.
Milwaukee

► Author Reul replies to the above comments as follows:

"1. This implies that the Profit-

ELPAR

"Air-Rights" Series

FORK TRUCKS

Complete Line For Low Cost Handling

The extensive ELPAR "Air-Rights" series includes the exact fork truck for your requirements. Here are five reasons why: **1.** Capacities range from 2,000 to 10,000 pounds (in increments of 1,000 pounds), and larger trucks up to 80,000 pounds are also available. **2.** Electric, gas-electric, Diesel-electric or LP gas-electric power can be supplied. **3.** Models include sit-down or stand-up, center or end control. **4.** There is a wide range of lift heights for every operation—carrier loading or extra-high stacking, light or heavy-duty work. **5.** ELPAR trucks can be specially adapted or equipped with any of a score of special attachments for out-of-the-ordinary jobs.

ELPAR electric trucks give fume-free, pennies-per-day operation with minimum maintenance. As a *plus* benefit, ELPAR field engineers assist your men in proper preventive maintenance. This *free, personalized,* service adds many years of truck life.

For all the facts, write for New Condensed Catalog.

THE ELWELL-PARKER ELECTRIC CO.

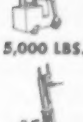
4020 St. Clair Avenue • Cleveland 3, Ohio

2,000 LBS.

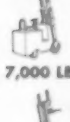
3,000 LBS.

4,000 LBS.

5,000 LBS.


6,000 LBS.

7,000 LBS.


8,000 LBS.

10,000 LBS.

Compact 25hp machine cleans 21" path . . .

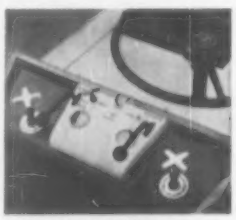
removes hard-packed soilage in 1 fast operation

This powerful new machine makes it easy for one man to do more than a 4 to 12-man crew—in cleaning factory floors.

In one operation the husky "Model L" instantly pulverizes bumpy traffic-packed dirt from a path 21" wide . . . and *picks it up at the same time.* Removes grease-caked soilage, metal chips, oil, rubber and other heavy deposits. Leaves a clean dry surface for trucking. Eliminates all need for water, steam, chemicals or costly hand scraping.

Easy to use; operator rides it

As machine propels itself, operator adjusts simple *hydraulic* controls for speed, forward-reverse, brush pressure, etc. Makes it easy for one man to clean 5,000 sq. ft. per hour . . . and handle 90% of all jobs in one pass. *Write today for more details about this EXCLUSIVE new machine and its cost-saving performance.*



HYDRAULIC CONTROLS regulate speed (1 to 3 mph), tool lift, brush pressure, etc. Very easy to use. Does clean job.

G. H. TENNANT COMPANY, 2554 N. 2nd Street, Minneapolis 11, Minn.

TENNANT FLOOR MACHINES

SPECIALIZED MAINTENANCE EQUIPMENT

Begins on page 3

ability Index does not use the annuity approach. PI does use it but does not straitjacket choice of income predictions within the basic assumption of unchanging income through investment life. The Scheuble method, on the other hand, has no way of introducing the effect of predictable variations in income. Also, the Scheuble yardstick does not evaluate the effect of more or less income after capital recovery, which has been defined by arbitrary choice of an interest rate. The only difference between the Scheuble method and old-fashioned payout is that he rules out the effect of income taxes and, by adding an interest-rate factor, accentuates the effect of time. Payout is a measure of risk, not of profitability.

"2. In investment evaluation, service life and length of utilization must be the same. If theoretical life is no longer than utilization, this fact must be compensated by assuming a salvage value. If the equipment is to continue in use—perhaps with smaller income—assumed length of utilization must be increased to match facts. On the other hand, I agree that both length and amount of utilization must be established before it becomes possible to calculate the true rate of return on your investment.

"3. The cash flow-back method implies that the enterprise (of which this investment is an incremental part) is profitable and is paying income taxes. This assumption is reasonable—and usually correct. But if the enterprise to which an investment is being added is losing money, this assumption is invalid and special handling of income-tax impact is indicated.

"4. In replacement, overhaul costs that can be expensed—rather than capitalized—are one of the alternatives to be evaluated. Any evaluation method must consider the difference in tax impact between these alternatives. Recent income-tax law changes, permitting use of declining balance or sum-of-digits for calculating depreciation, can lead to large variances in tax impact. Any method that does not consider these impacts—when they occur—is unrealistic."

The BIG, BIG 60-INCH DIFFERENCE *in aisle space means money in your pocket!*

Conventional counterweighted truck needs 136″ aisles... Automatic's TRANSVEYOR needs only 76″... *Use the difference for storage!*

The above dramatically illustrates the savings in storage space made possible with the Transveyor. Its short chassis and tight turning radius also enables it to operate swiftly and efficiently in cramped areas throughout the plant where less maneuverable trucks could not work.

Rugged and compact, the Transveyor is packed with exclusive Automatic job-proved features.

Its *Balanced Action* equalizes load on both wheels, automatically...compensates for uneven floor surfaces with the exclusive center-pivoted feature which eliminates frame distortion and uneven load distribution.

Transveyors are available in stacker, low lift pallet or platform models to serve a wide range of requirements. All can be leased under Automatic's exclusive "Earn-Its-Own-Way" plan without 1¢ of capital investment. Convenient budget purchase plan is also available. Send for complete information today.

Dimensions based on use of 48″ x 48″ pallets

GET THE FACTS...MAIL THIS COUPON

Automatic®

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

Automatic 3° West 87th Street, Dept. A-6 Chicago 20, Illinois

☐ Send me complete information on Automatic Transveyors.
☐ Include data folder on the Automatic "Earn-Its-Own-Way" plan.

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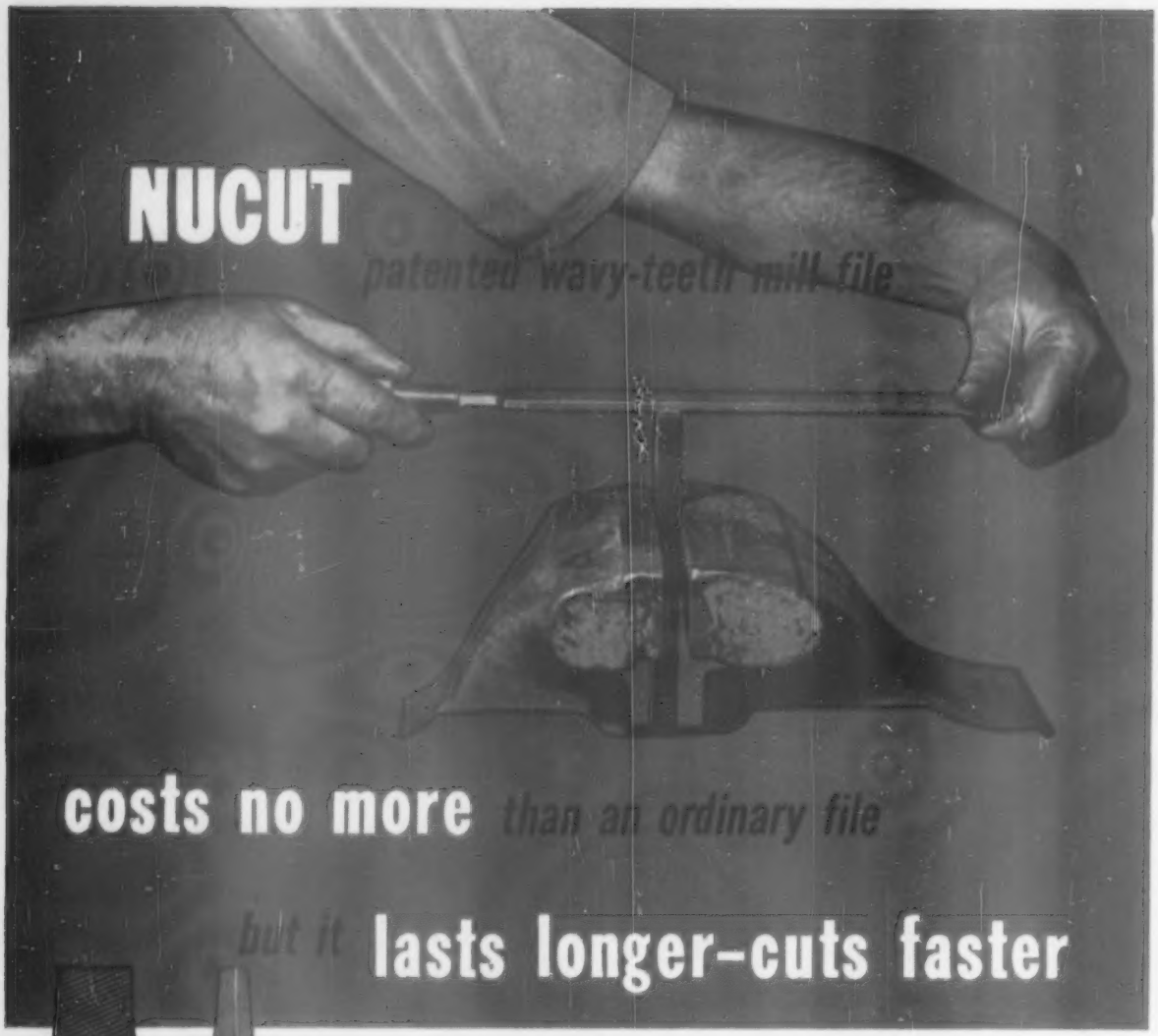
By.....Title.....

Address.....

City & Zone.....State.....



Heller NUCUT files combine coarse, fine and extra fine teeth in a planned irregularity, creating the "wavy-teeth" design. The coarse teeth cut deep, clean; the fine teeth leave a smooth, scratch-free finish. This "Wavy-Teeth" design makes the file clear itself, adds longer life. NUCUT "wavy-teeth" files cut faster without scraping or chattering. Ask your distributor for Heller NUCUT files with patented "wavy-teeth."

HELLER TOOL CO.

A Subsidiary of Simonds Saw and Steel Company

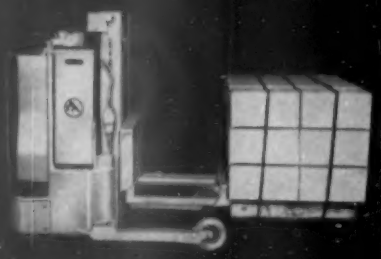
NEWCOMERSTOWN, OHIO

HELLER TOOL CO. SINCE 1836

BRANCH OFFICES: New York, Chicago, Detroit, Los Angeles

YOUR HELLER DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS

New L-S HydraFork with extendible forks



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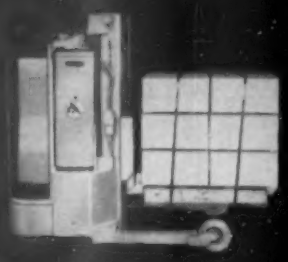
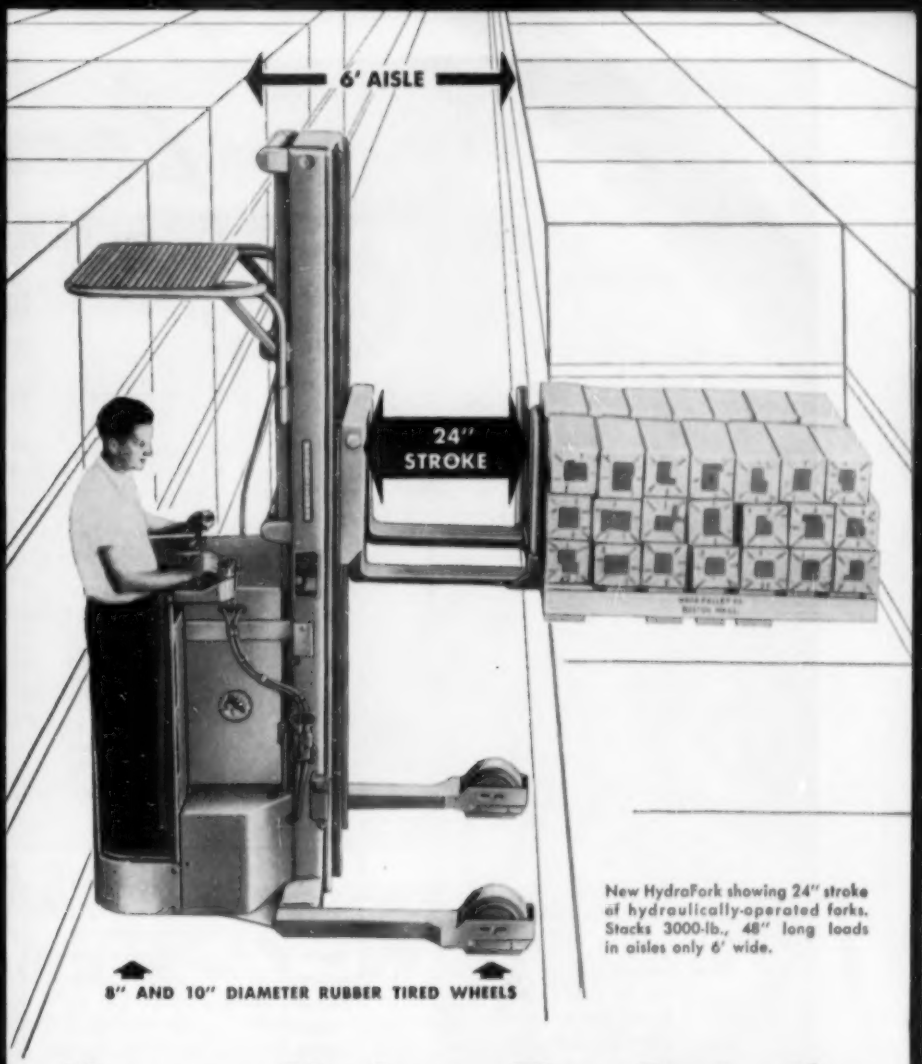


LOAD RETRACTED

Want narrow aisles?
Want maximum floor protection?
Want to use your existing racks and pallets? . . .

You want a HydraFork!



New HydraFork showing 24" stroke of hydraulically-operated forks. Stacks 3000-lb., 48" long loads in aisles only 6' wide.

Gives you Maximum Floor Protection in Minimum (6') Aisles

Here's a narrow-aisle truck that does not straddle loads, consequently it can be equipped with large 10" diameter rubber-tired load wheels that are easy on your floors. To pick up a load, the operator simply positions the truck; extends the hydraulically-operated forks into the pallet; lifts; and retracts load into the truck. No aisle space is wasted for maneuvering when picking up or depositing loads.

And, the HydraFork has all the other exclusive Lewis-Shepard features which have made Lewis-Shepard trucks a symbol of quality across the country: "Lubricated-for-Life" design; Roller Masts, Magnetic Controls, Gear Drive, etc. Get full information on the HydraFork — available in "walkie" or riding types, with capacities to 3,000 lbs. It's the latest addition to the L-S Master Line, the only complete line of materials handling trucks on the market. Send for catalog. Use the coupon below.

RECENT REORDERS PROVE L-S DEPENDABILITY

Listed are typical reorders from blue chip companies in various industries:

Chemical Mfr.	has 52 L-S — reordered 3
Electrical Goods	has 255 L-S — reordered 3
Food Packer	has 70 L-S — reordered 2
Grocery Chain	has 57 L-S — reordered 3
Rubber Goods	has 57 L-S — reordered 4

MULTIPLY MAN-POWER LEWIS-SHEPARD

"The Master's Line"

LEWIS-SHEPARD

151 Walnut St., Watertown 72, Mass.

Please send catalog on ☐ L-S HydraFork ☐ L-S Master Line Trucks

Name _____

Company _____

Address _____

Lamson

1035 CAP SCREWS OFFER GREATER STRENGTH AT...

Less Cost!

If you are now using Full Finished Screws in your assembly operations it will pay you to consider substituting Lamson 1035 Double Heat Treated Cap Screws.

The extra relative toughness of Lamson 1035's enables you to use screws of smaller diameter, yet with equal, or greater, tensile strength.

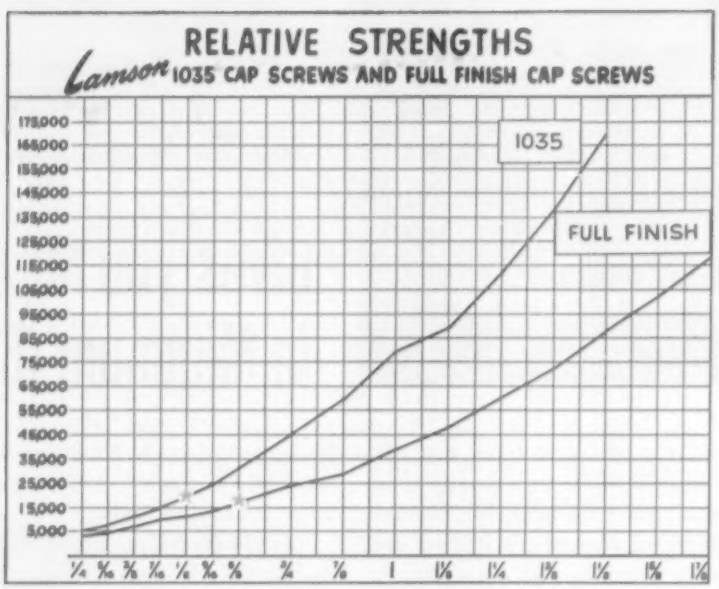
As an example of increased strength at less cost—on the chart below you will see that a ½"* diameter Lamson 1035 Cap Screw has greater tensile strength than a ⅝"* diameter Full Finished Cap Screw. This means savings in weight and size of assembly.

As for money savings—Lamson ½" x 2" 1035 Cap Screws are net priced at $5.36 per hundred as compared to $7.59 per hundred for the ⅝" x 2" Full Finished Screw. Proportionate savings can be made all along the line.

Lamson 1035 Double Heat Treated High Tensile Cap Screws have long been favorites where extra strength and durability is required.

To attain this extra strength, Lamson Cap Screws are first heat treated at about 1600°F. and then quenched. This imparts "hardness". Then the screws are "drawn", or re-heated, to between 900°F. and 1100°F. and then quenched in a special oil.

This results in a minimum tensile strength of 150,000 pounds per square inch.



YOU GET MORE WHEN YOU BUY FROM...

Lamson & Sessions

The LAMSON & SESSIONS Co.

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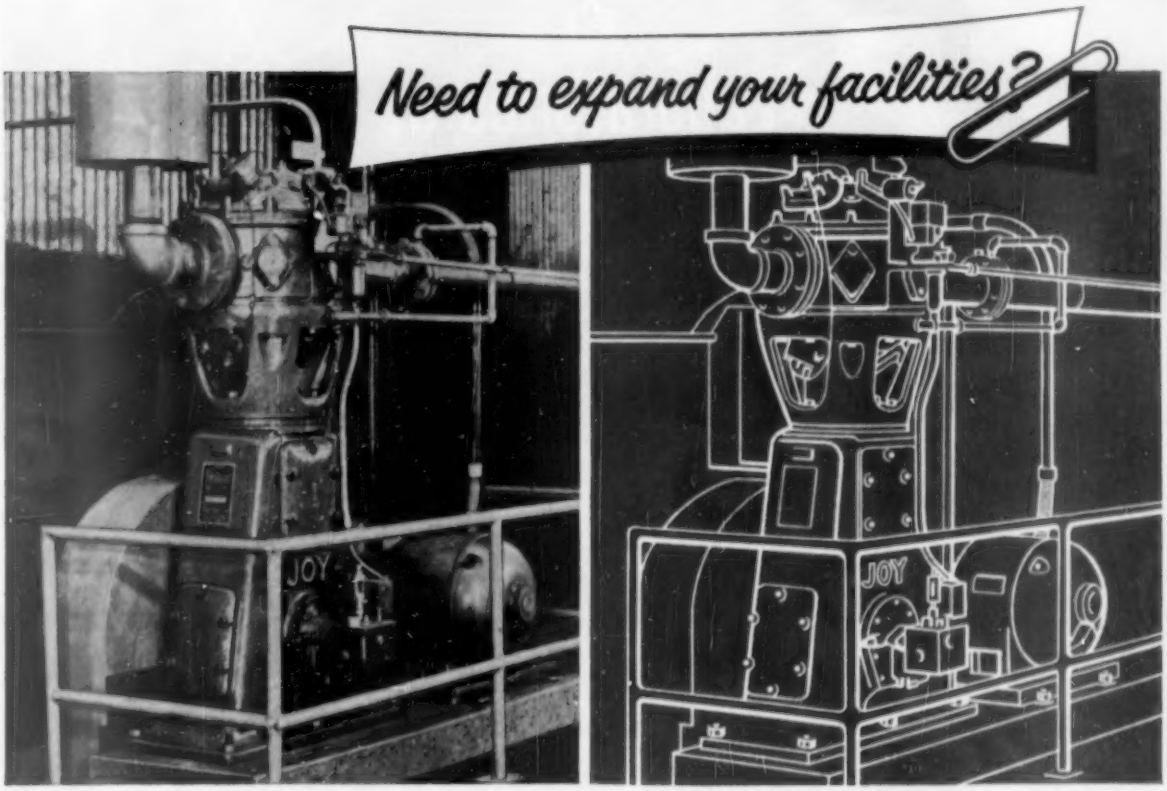

Add compressed air power efficiently with the JOY WG-9

The Joy WG-9 *heavy-duty* vertical air compressor is a natural for supplying additional air for an existing system, either centralized or decentralized.

Because of its smooth running characteristics and the small floor area required, the WG-9 needs only a simple, block-type foundation. The average base dimensions of a larger model WG-9, *including motor,* are 7′1″ by 4′1″. This means greater capacity per square foot of floor area—42 CFM per square foot on the 100 psi rated machines.

Thus, the WG-9 packs large compressor capacity in a small compressor area. It is possible to install the machine in a central compressor room where unused floor space is at a premium, or in a decentralized plant location where crowding of machinery is a problem.

If you have plans for a small plant, the WG-9 is designed to give you continuous 24-hour heavy-duty service. It is also widely used to meet special requirements in larger operations, such as boosting air above standard plant pressures.

The Joy WG-9 is a water-cooled compressor, available in capacity ranges up to 881 CFM piston displacement and in pressures up to 150 psi. Standard drive is multiple V-belt. This machine can be furnished for flat belt or vee flat drive if desired.

LARGE COMPRESSOR FEATURES INCORPORATED IN ALL WG-9 SERIES

- Full Force Feed Lubrication
- Joy Patented "Dual-Cushion" Valves
- Anti-friction Main Bearings
- Replaceable Cylinder Liners and Crosshead Guides

Write today for full information. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 22-12

Consult a Joy Engineer

For Air and Gas Compressors, Oxygen and Nitrogen Generators, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors, Hydraulic Fittings and Hose Assemblies.

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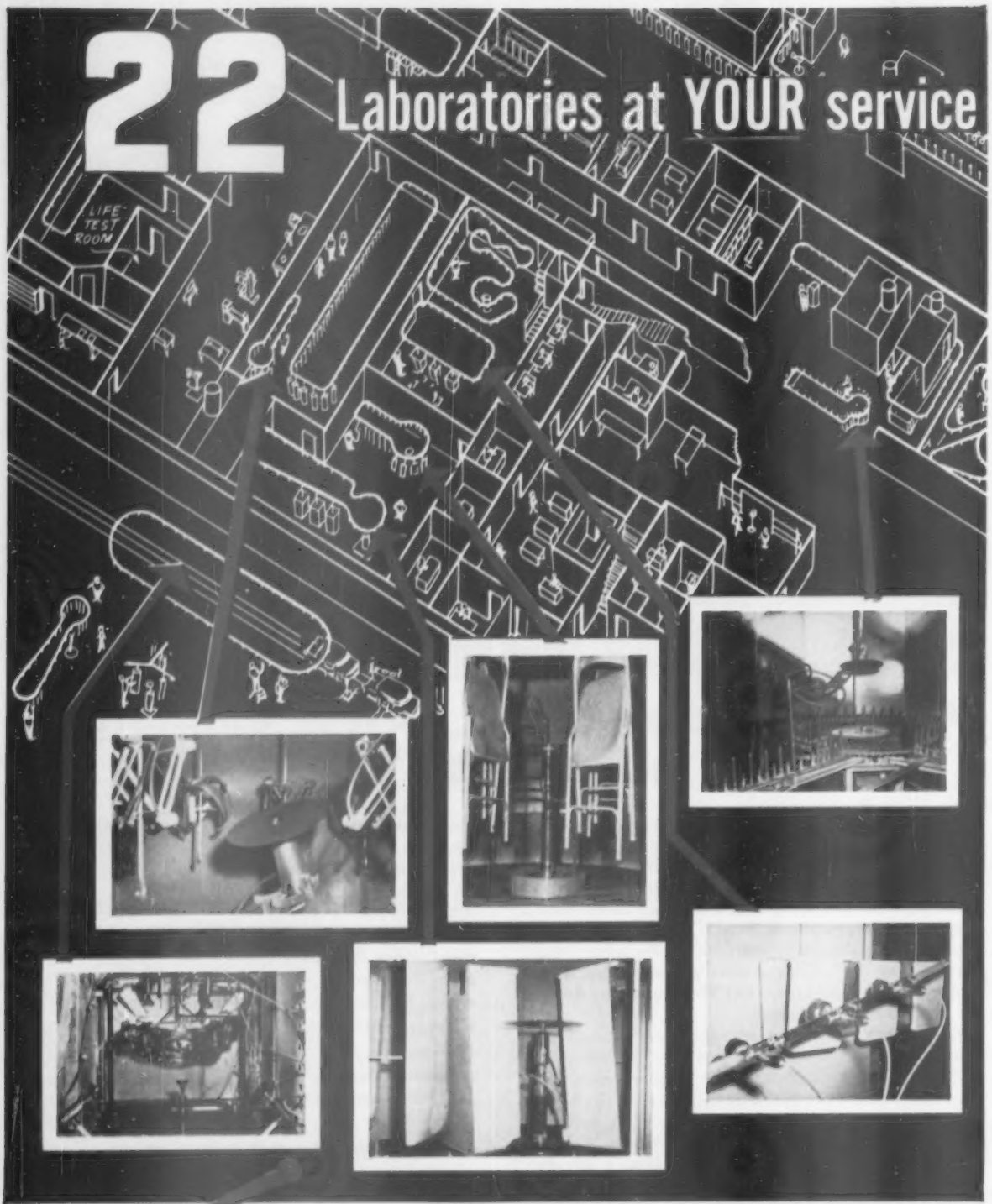
JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

22 Laboratories at YOUR service



YOUR JOB, LIKE THESE SHOWN ABOVE, WILL BE TEST PROVEN

under simulated production conditions to determine cost-saving benefits and other advantages. Ransburg also maintains other test facilities in Los Angeles, London, England; Bad Hersfeld, Germany; Paris, France and Sydney, Australia.

to prove the painting of YOUR products with

RANSBURG

Electrostatic Painting Processes

Let us make laboratory tests and prove the advantages and cost-saving benefits of painting YOUR products AUTOMATICALLY with one of the Ransburg Electro-Spray Processes.

GET THE FACTS . . . IT COSTS YOU NOTHING!

STEP BY STEP—HERE'S WHAT YOU GET . . .

- Survey of your plant by Ransburg's experienced field engineers, including savings estimate.
- Lab painting demonstration of your products, using equipment closely simulating your own production conditions.
- Accurate measurements of paint film thickness.
- Engineering report of detailed tests to determine paint and labor savings.
- Coated samples of your job, lab production photos, and even movies if desired.
- Detailed drawings of equipment and workholder.

All of the above without obligation to you. And, before equipment is installed you receive detailed, pre-installation instructions. Too, a well-qualified, experienced engineer supervises installation and trains your operator on the job. Ransburg offers continuing laboratory and field service to help you with any of your finishing operations.

Ransburg

ELECTRO-COATING CORP.
Indianapolis 7, Indiana

● **First,** Ransburg sales engineers will make a survey in your plant to check the possibilities of using Electrostatic Spray Painting on your products. Next, you will send samples of your unpainted products—with paint—to the Ransburg laboratories in Indianapolis.

Here, the technical staff takes over. The Ransburg Engineering staff—which includes PH.D's and Masters in Physics, Science, Electrical, Mechanical and Chemical Engineering—makes a complete study of your job. Not only do they have the necessary academic training, but they have the "know how" gained from years of actual experience in the field. Ransburg, you know, was the pioneer in Electrostatic Spray Painting 15 years ago. Engineers and well-qualified technicians have at their disposal every facility for conducting complete tests, simulating your own production conditions. They'll decide which type conveyor is best suited for your job. (There's a conveyorized lab set-up—22 in all—to handle products ranging in size from automobile bodies and chassis to small components, such as window hardware.) They'll design workholders, if necessary, and determine exactly how your job can be run to your best advantage. Details, such as fixture spacing, will be worked out too.

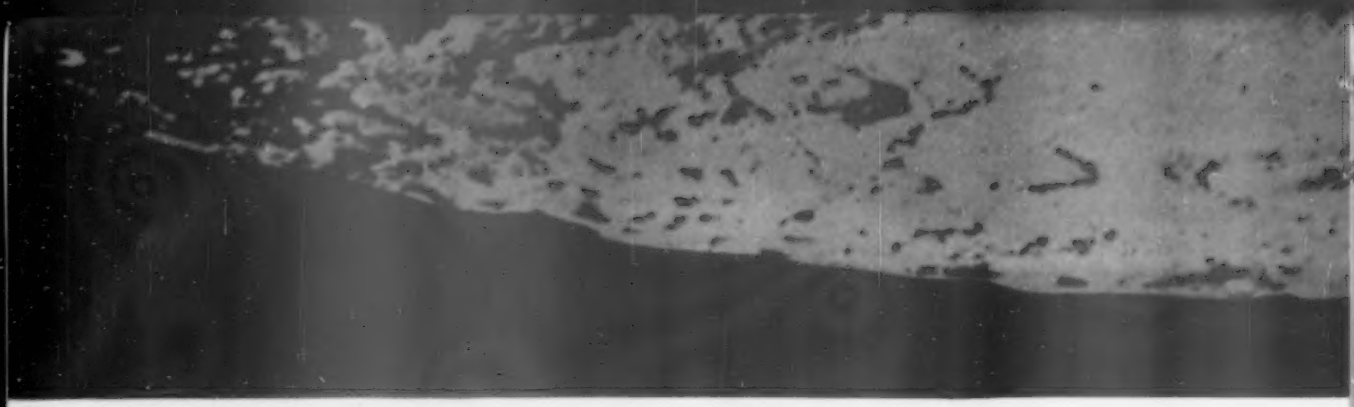
After preliminary studies and tests, you are invited to Indianapolis to see your job run in the lab. If you wish, photos and even movies of your test run can be made and furnished for your own production people to study. You see first-hand what Ransburg Electrostatic Spray Painting can do for you in your own plant.

YOU GET PAINT AND LABOR SAVINGS

Paint usage is accurately measured during the demonstration. The Ransburg No. 2 Process will provide savings up to five times the paint mileage of hand spray. And, one unit can do the work of many hand sprayers. You will see the improved, uniform quality of the work . . . you'll know what kind of increased production to expect, and you can recognize labor savings. ALL OF THIS WITHOUT OBLIGATION.

Ransburg service doesn't end there. After the equipment is installed in your plant—with our supervisory help—we will train your operator and continue to work with your finishing department. Our technically-trained field service engineers are always available to assist with any of your finishing problems.

Briefly, that's our story. Now it's your move. Call or write.



ONCE IN A BLUE MOON

Jones & Lamson is in the habit of coming up with excellent turret lathe developments, but only "once in a blue moon" do we offer so *many* at once.

All-out efforts in research and development have been turned towards designing machines that will reduce costs, increase production and keep both operators and management happy.

Here are some of the results:

We've developed simple "on-the-machine handling" with effortless and integrated control through Hydra-Clutch Headstocks and Geneva Saddles.

We've combined necessary horsepower with field-proven experience on how to use it.

We've combined two-way tracing with normal turret lathe operation.

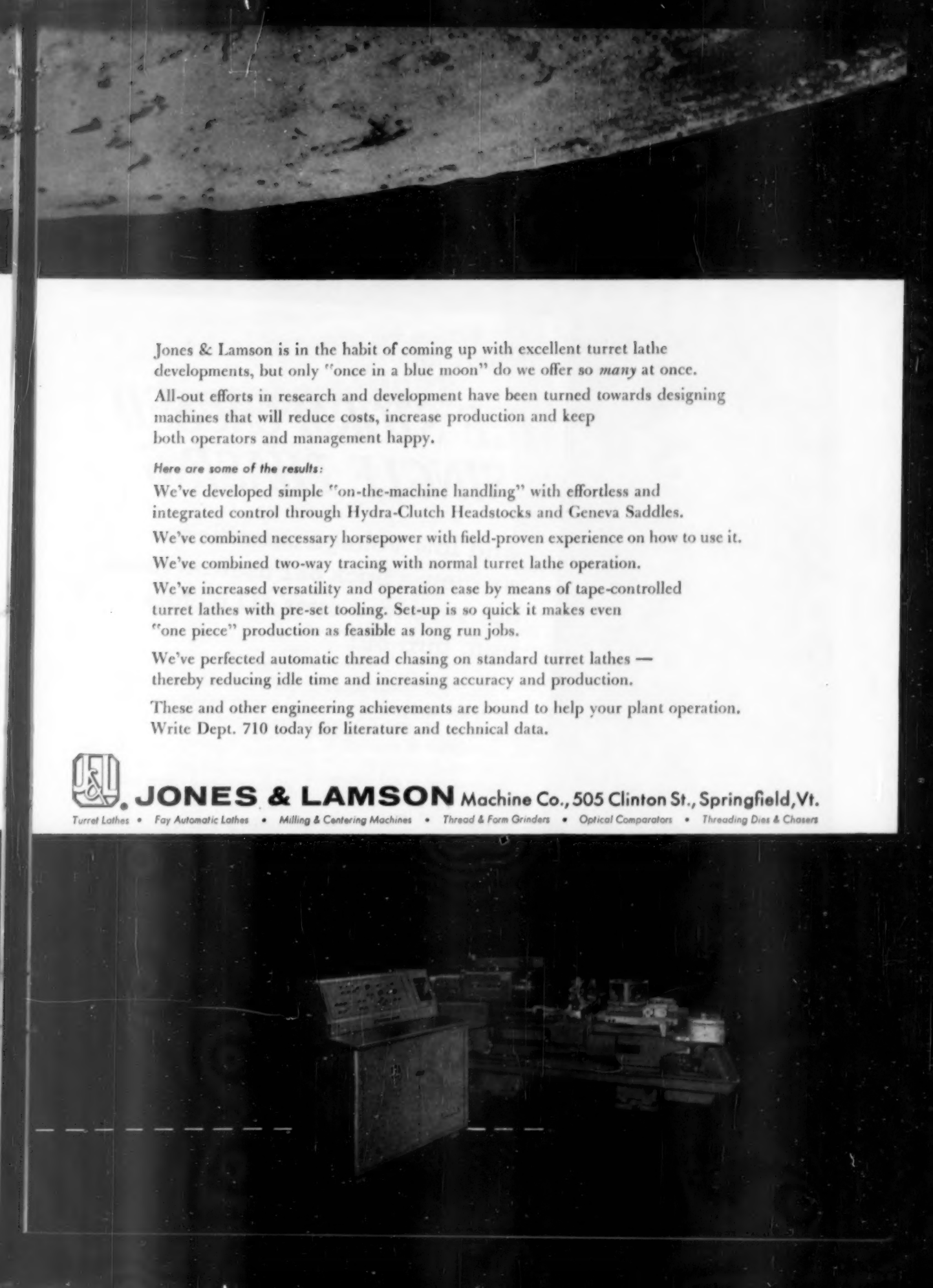
We've increased versatility and operation ease by means of tape-controlled turret lathes with pre-set tooling. Set-up is so quick it makes even "one piece" production as feasible as long run jobs.

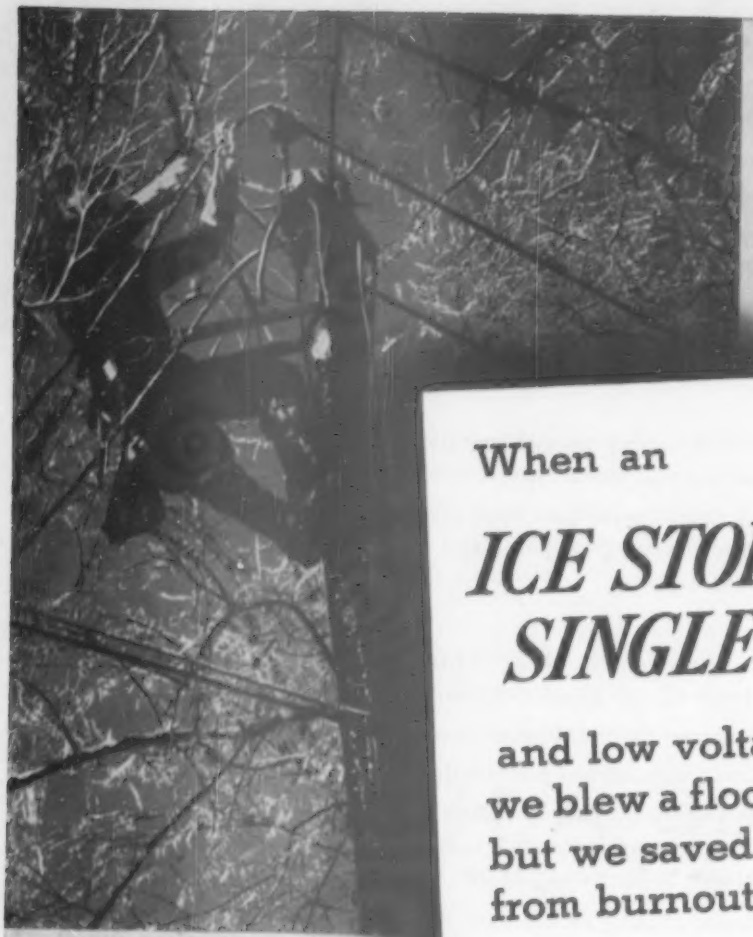
We've perfected automatic thread chasing on standard turret lathes — thereby reducing idle time and increasing accuracy and production.

These and other engineering achievements are bound to help your plant operation. Write Dept. 710 today for literature and technical data.

JONES & LAMSON Machine Co., 505 Clinton St., Springfield, Vt.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Thread & Form Grinders • Optical Comparators • Threading Dies & Chasers





When an

ICE STORM CAUSED SINGLE PHASING

and low voltage conditions . . we blew a flock of Fusetron fuses but we saved over 40 motors from burnout

"For twenty-four hours after the bad ice storm of February 15, 1950 we were endangered by single phasing and low voltage conditions due to the damage done the power lines by the ice.

"During this period, we blew a flock of Fusetron dual-element fuses—around 240 in fact—but we figure that was a very cheap price to pay for saving over 40 motors from burning up.

"After this experience we didn't lose any time in putting all of our plant and equipment under Fusetron Fuse protection."

Michael G. Kupcho,
Master Mechanic
Ashland Shirt and Pajama Company
Ashland, Pennsylvania

You too, can be safe from electrical hazards by using

Fusetron DUAL ELEMENT Fuses

They provide 10 Point Protection

1 High interrupting capacity—protect against heaviest short-circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes.

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating—lesser resistance results in cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

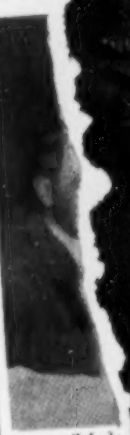
8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

Write for bulletin FIS.

DON'T RISK LOSSES — *Start today to install FUSETRON fuses throughout the entire electrical system!*



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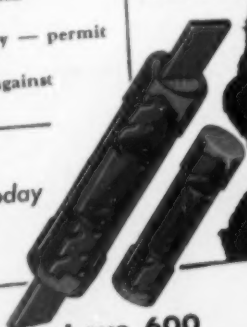
"Obtaining will not smea when some on cement on th Rotometer t



FUSETRON

TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION

BUSS

For loads above 600 and up to 5,000 amps., . . . use BUSS Hi-Cap Fuses . . .

They have unlimited interrupting capacity to handle any fault current regardless of system growth.

Overload protection as well as short-circuit protection.

Coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuits of origin.

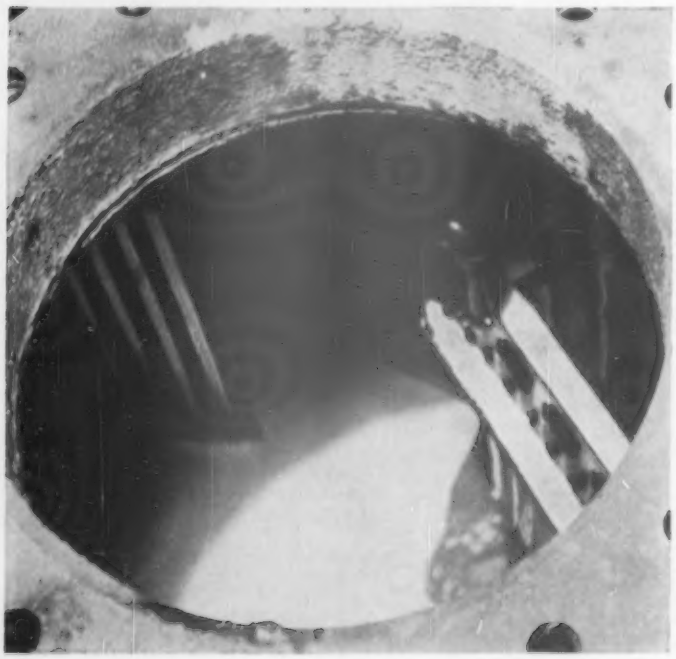
Dependable service through the years because there are no moving parts to stick or get out of order.

Write for bulletin HCS.

BUSSMANN MFG. CO. (Div. of McGraw Electric Co.) St. Louis 7, Mo.

MAINTENANCE SLASHED AT LINCOLN MERCURY

New cars that are marred or scratched are "touched up" and run through this 150-foot paint-drying oven at the Lincoln-Mercury plant at Robertson, Mo. Heat comes from 44 Platecoils, each 22" wide and 119" long. An individual unit can be replaced in minutes without disturbing other units.

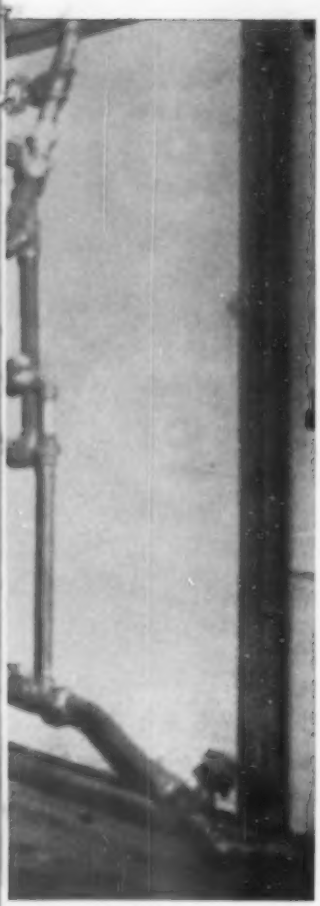


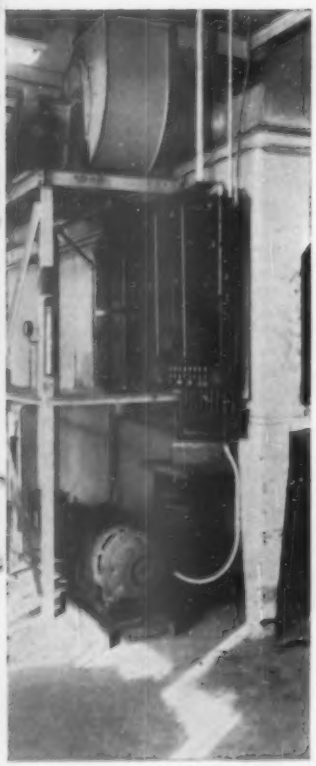
NEW PLATECOILS COST LESS THAN MAINTENANCE

Just removing the motor, agitator and bolted-down tank cover to get at pipe coil in a slurry cooling tank cost Sherwin-Williams Co. more than the price of Platecoils that do the job now. Platecoils can be installed through the manhole in the cover.

$1440 SAVED YEARLY AT BURROUGHS

Monthly cleaning of black iron pipe coils used for heating in a Parker Bonderite system cost Burroughs Corporation $1,440 a year. Electroplated Stainless Steel Platecoils required no cleaning in a year. In addition, heat up time was reduced from 2 hours to only 30 minutes.





Please send me the Platecoil story.

My problem is _____

_____

Name _____

Company _____ Title _____

Address _____

City _____ State _____

TRANTER PLATECOILS®

SAVE A LOT OF TIME AND SOME MONEY

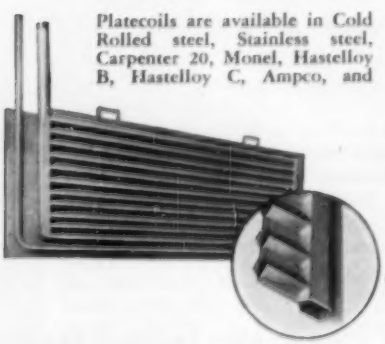
Add up all the manhours you spend in engineering, fabricating, installing and maintaining pipe coils for process heating and cooling. When you use Tranter Platecoil heat transfer units, you eliminate engineering and fabricating time and drastically slash installation and maintenance time to make big savings. And frequently you can add more savings that come from increased tank capacity and a shorter operating cycle that Platecoil's compact size and extra efficiency make possible. Tranter Platecoils come in standard sizes and give dependable standardized performance. Delivered to you from factory-tested stock, they are ready to go to work for you when you get them. Installed on quick-change hangers, these lightweight compact units can be installed or replaced in a few minutes without hoists or other machinery. They will save you a lot of time and some money.

THESE ADVANTAGES CUT COSTS

Platecoils take less room than pipe coils and increase the work load capacity of the tank. They save valuable floor space. Their rigid, continuous, relatively flat surfaces give more heat transfer to handle increased work loads. And this flat surface resists accumulation of deposits and is easier to clean than a jumble of old-fashioned pipe coils.

NOW AVAILABLE IN THESE METALS

Platecoils are available in Cold Rolled steel, Stainless steel, Carpenter 20, Monel, Hastelloy B, Hastelloy C, Ampco, and Nickel. Orders for Cold Rolled steel and Stainless steel get fast delivery from factory-tested stock.



PLATECOIL

DIVISION

TRANTER MANUFACTURING, inc.

760 E. Hazel St., Lansing 4, Michigan

New SKIL Shear Sweeps Field in Actual Comparison Tests!

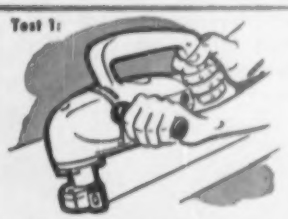
SKIL Model 231 Wins 5 Trials Out of 5 Outperforms, Outproduces All Others

Production men are voting quick approval of this superb new SKIL Tool. Already its superiority is earning more and more recognition for the 231 Shear as a real asset in the plant. Fast, clean *performance* slices important time off key production cutting. Versatility lets you do more kinds of jobs than other shears. And, *down-time* is kept *to a minimum* because of a design that greatly simplifies maintenance.

Actual tests, rigidly conducted, prove what many sheet metal men are learning for themselves. The new SKIL 231 Shear is far superior to all others on the market. These tests show the speed, power, and control that are making the SKIL Shear so popular on every job . . . in every shop.

Here are actual results of impartial tests of the SKIL Model 231 Shear and competitive brands. Shown are performance figures for SKIL, Brand A, and Brand B. In every case, SKIL superiority speaks for itself!

Test 1:

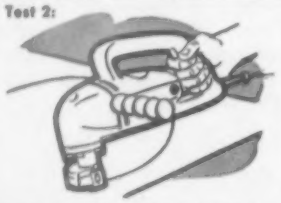


25" Trial Cut of 12 Gauge Metal

Model 231.....9.2 seconds
Brand A.....15.3 seconds
Brand B.....12.0 seconds

A good reason for SKIL's higher production rate.

Test 2:



Cutting Right and Left Hand Circles

Model 231.....22.0 seconds
Brand A.....24.0 seconds
Brand B.....22.2 seconds

SKIL leads on both right and left hand cuts.

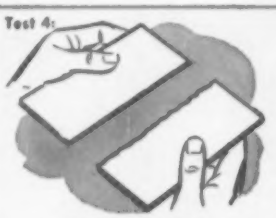
Test 3:

Small Diameter of Circle Cuts

Model 231.....1½"
Brand A.....2"
Brand B.....2½" (right hand)
Brand B.....4½" (left hand)

SKIL leads on small diameter cuts.

Test 4:

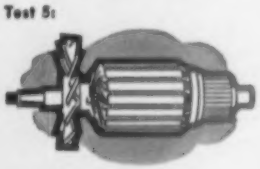


Cleanness of Cuts

RATING
Model 231.....Excellent
Brand A.....Good
Brand B.....Poor

SKIL consistently cuts cleaner.

Test 5:

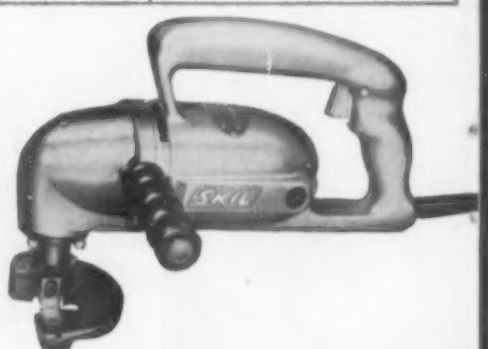


Power and Performance

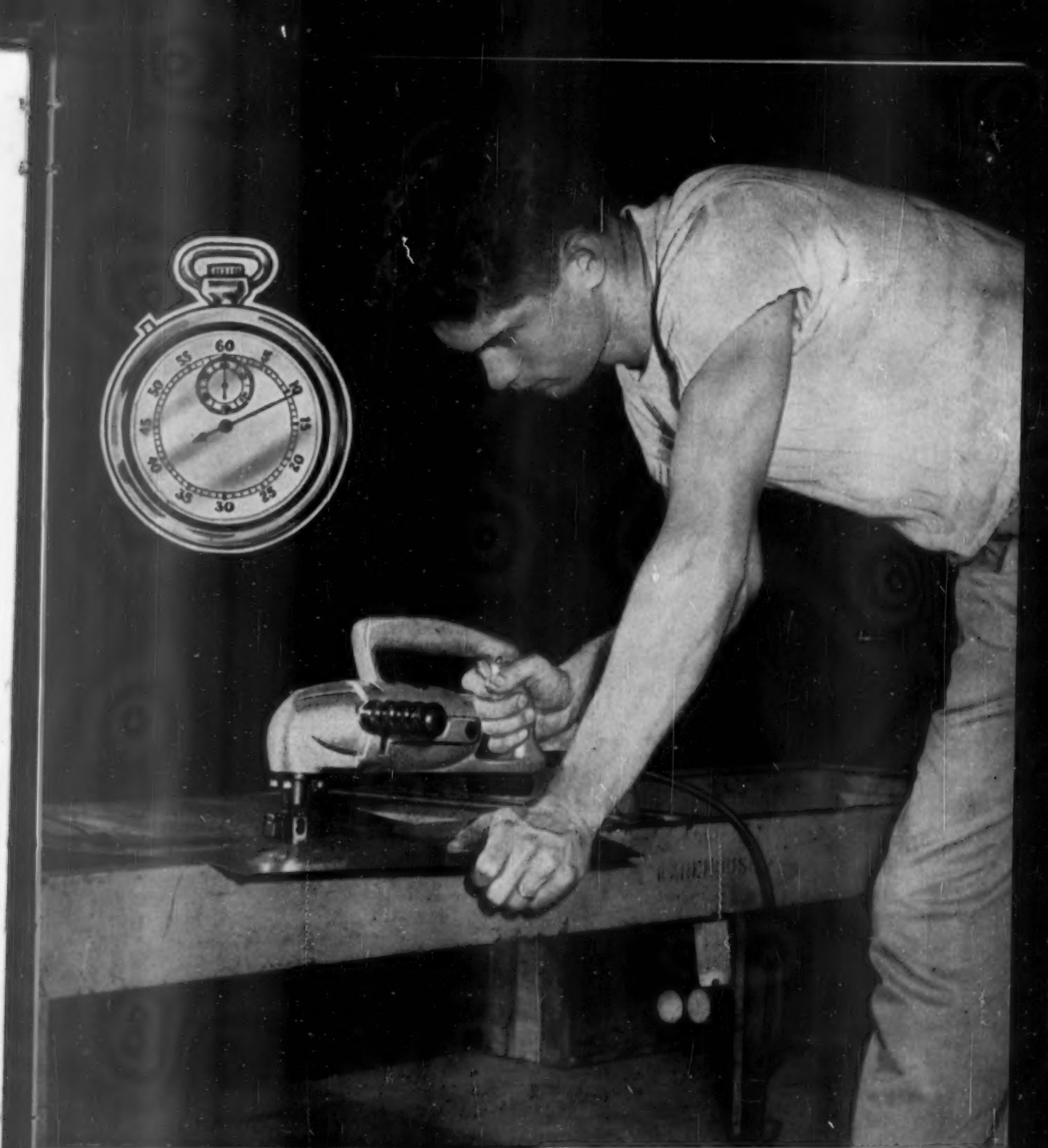
Model 231.....40% more powerful
Brand A.....than Brand A, 33⅓%
Brand B.....more than Brand B.

SKIL SHEAR 231— Best All-Around

These tests prove Model 231 the best all-around shear on the market today. Faster, easier handling, more powerful! Features like the Contour Grip Handle at the rear of the tool make it a favorite with workmen who have tough cutting to do. Improved foot design keeps maintenance costs down for job superintendents. This is the shear you need in *your* shop. The SKIL Model 231.



CONTACT YOUR SKIL DISTRIBUTOR—OR YOUR NEARBY FACTORY BRANCH—FOR COMPLETE INFORMATION



SKIL

PORTABLE [illegible] TOOLS

Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Ave., Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in All Leading Cities

FREE! Mail the Coupon for a Demonstration and a FREE Trial of the SKIL SHEAR Model 231! See How Much Faster, Easier-Handling this New SKIL SHEAR is on your Toughest Cutting Job!

Mail this coupon!

SKIL Corporation, Dept. FM-16
5033 Elston Avenue, Chicago 30, Illinois

☐ I would like a demonstration and free trial.
☐ Please send literature on New SKIL Shear.

Name_____

Company_____

Street_____

City_____ Zone_____ State_____

QUI

ET!

Only Quiet One-Shot "Magnamatic" has Torque Control PLUS all these advantages:

- Doesn't require frequent readjustment to hold torque value
- Completely disengages the instant the fastener is run to desired tightness.
- Eliminates stripped threads, sheared fasteners, surface damages.

"Magnamatic" controlled- torque screwdriver at work!

CP One-Shot "Magnamatic" is the quietest screwdriver-nutrunner ever developed! Clutch buzz and ratcheting have been eliminated and exhaust noise is effectively muffled by a new principle of baffling.

Quiet One-Shot "Magnamatic" is an air-driven screwdriver-nutrunner that can be set to run nuts and screws to specified torque. Here's how: The Alnico magnetic One-Shot clutch, adjustable to specified torque, disengages completely the instant the fastener is driven to desired tightness. Maintains the selected torque setting indefinitely—prolongs clutch jaw life. Inexperienced operators don't burr screw heads, strip threads, shear fasteners, or damage work. Screw bits last longer.

CAPACITIES:

#4 screws to ⅜" bolts.
Reversible and non-reversible types.

Chicago Pneumatic

Pneumatic Tools • Air Compressors • Electric Tools • Diesel Engines
Rock Drills • Hydraulic Tools • Vacuum Pumps • Aviation Accessories

Chicago Pneumatic Tool Company, Dept. M-14
8 East 44th Street, New York 17, N. Y.

- ☐ Please send me FREE booklet SP-3165 "Magnamatic Case Histories."
- ☐ Please send me "Magnamatic" Bulletin SP-3126.
- ☐ Have representative call.

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

★ *Eliminate Motor Burnouts*
★ *Reduce Production Down Time*
★ *Minimize Motor Repairs and Replacements*
★ *Plus maximum motor capacity under any conditions*

Klixon Protectors in your 3-phase motors, single and dual voltage, are a sure way to keep today's rising operating and replacement costs down.

Built-in as an inherent part by the motor manufacturer, the Klixon Protector saves money and reduces idle machine time by preventing the motor from burning out under the following conditions:

1. Extremely heavy overloads
2. Single phasing
3. Stalling
4. Failure to start
5. Lack of ventilation
6. Increase in ambient temperatures
7. Plugging or reversing duty

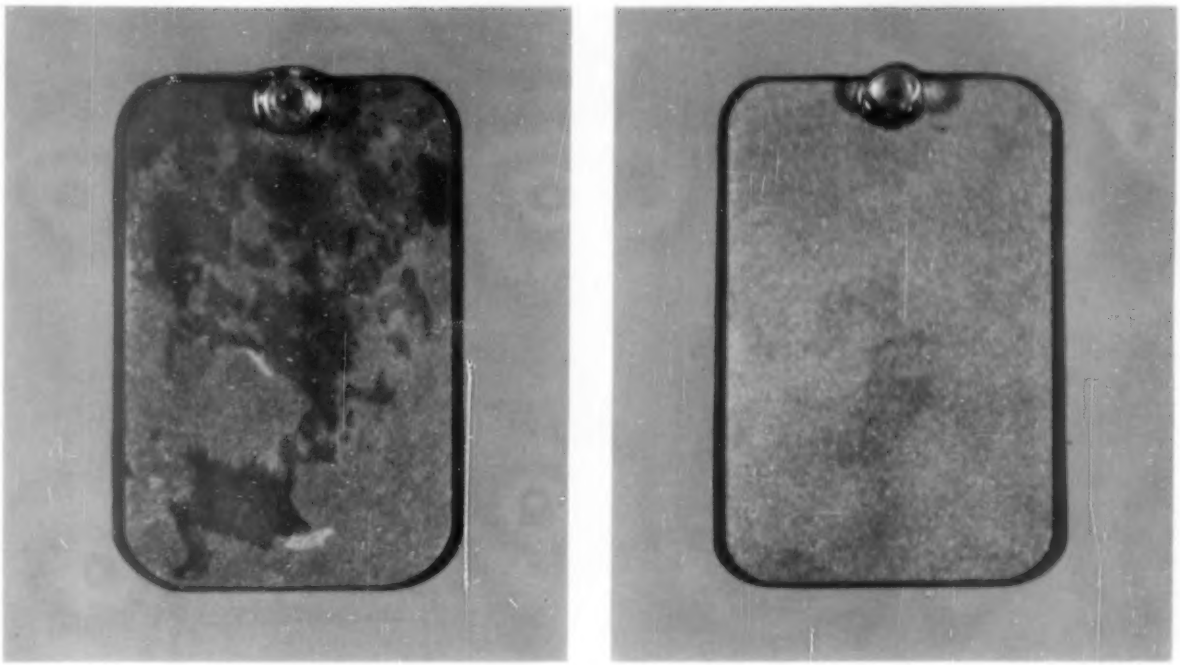
This means that you have less equipment shutdowns . . . less motor repairs and replacements.

Klixon 3-phase Motor Protectors are available in four sizes — covering a range of horsepower ratings from fractional up through 7½ hp. (600 V.).

And remember, be sure to get complete motor protection in your single phase motor, too. Specify and use motors with Klixon Inherent Protectors. The additional cost is low . . . the savings high. Write for Bulletin MOPR1 which explains inherent motor protection.

KLIXON

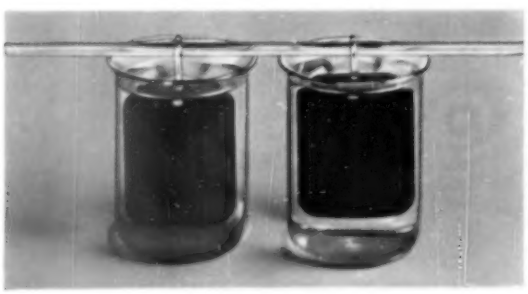
METALS & CONTROLS CORPORATION
SPENCER THERMOSTAT DIVISION
4101 FOREST STREET, ATTLEBORO, MASS.



Efficiency of New Sun Rust-Preventive Grease is shown by accelerated test. Rusted test plate (left) was coated with ordinary grease. The large amount of rust was formed during a 48 hour immersion in synthetic sea water. Plate (right) protected by new Sun rust-preventive grease is wholly rust free after 48 hours.

NEW GREASES PREVENT HARMFUL RUST

Sun rust-preventive greases give improved lubrication ...protect against wet or humid operating conditions



In 48 Hour Synthetic Sea Water Test, rust from plate coated with ordinary grease has turned water yellow (left). Water remains crystal clear in beaker with plate protected by new Sun rust-preventive grease (right).

Water contamination in grease-lubricated parts reduces lubricant life, promotes corrosive wear, and may lead to failure of bearing surfaces.

Sun Oil's new rust-preventive greases are specially fortified to overcome this problem. They give extra protection against both direct water contamination and indirect water contamination caused by high humidity and condensation during overnight and week-end shut downs.

Available at the price of ordinary greases, new Sun rust-preventive greases come in many different grades. For complete information, see your Sun representative, or write for Sun Technical Bulletin 38. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. GI-1.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO & MONTREAL

SUNOCO

PLEASE TURN TO NEXT PAGE

New buttery grease now protects against rust under highly adverse moisture conditions.

New tacky grease prevents throw-off... reduces consumption. Highly resistant to water.

New high-temperature grease for anti-friction bearings. Exceptional stability, longer life.

NEW SUN RUST-PREVENTIVE GREASES SAVE YOU MONEY IN 3 WAYS

- **Prevent wear... and rust... on 90% of all grease jobs**
- **Serve as low-cost rust preventives for storing shop equipment**
- **Save storing and handling special-purpose greases**

Sun Oil Company's new greases are fortified to protect against rust. Lubricity is improved and wear is reduced because grease-lubricated parts are now protected at all times against rust and corrosion caused by condensation and process water.

The effective life of these new rust-preventive greases is approximately twice that of conventional greases operating under wet conditions. And, their extra protection against moisture permits their use as a rust-proofing medium for shop storage of tools and parts.

Competitively priced with ordinary greases, these new greases can be applied by any conventional method... brush, swab, pressure gun, or through central pressure systems.

Because of their improved quality, these new Sun greases will now perform 90% of all grease lubrication jobs. You reduce grease inventories ...lessen the risk of using the wrong grease... simplify your handling problems.

For complete information, see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. GI-2.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

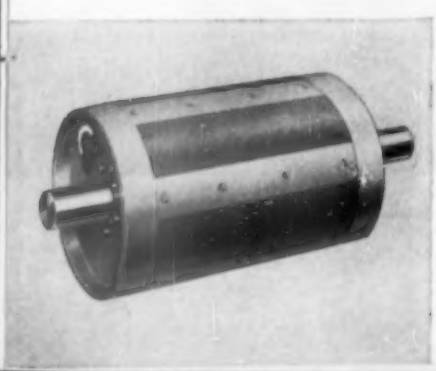
SUN OIL COMPANY, PHILADELPHIA 3, PA.

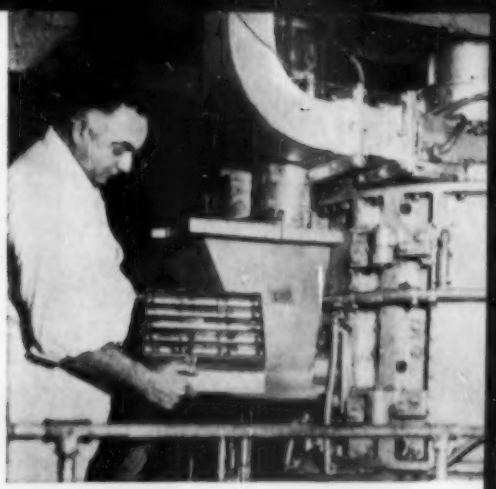
IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

OLD IRON PANTS AND THE MAGNET! A lady from yesterday with a metal-ribbed girdle wouldn't be safe next to an Eriez Permanent Magnet. She might easily be "hung up" by the powerful Alnico V action. This idea of herculean power is practically applied in industrial processing lines. Magnets convey and control metals, and remove dangerous tramp iron preventing fires, machinery damage and product contamination. *All Eriez Magnets are non-electric, self-contained. They operate without any wires or attachments. Best of all their magnetic power lasts a lifetime. The first cost is the last.*

MAGNETIC IDEAS FROM ERIEZ

ERIEZ PULLEY WATCHES YOUR BELTLINE. The idea of this Eriez Magnetic Pulley is to reduce tramp iron . . . tramp iron which is hidden in wet or dry material passing on conveyor belts of rubber, leather, canvas, stainless steel, etc. Pulley sizes range from 4" to 30" diameter, in belt widths from 4" thru 72". The rugged construction and powerful magnetic strength of Eriez Pulleys give you trouble-free operation and efficient protection against tramp iron damage to costly crushers, grinders, pulverizers, stokers, etc. Want more information on this product? . . . request Bulletin 501.





ERIEZ GRATE MAGNET DOING SWEET JOB. *Purity* is the watchword at Boweys, Inc., Chicago concern making quality chocolate powder and syrups. Fine iron contamination and an occasional nut or bolt (tramp iron) could cause product contamination and damage the mills that grind to extremely close tolerances. To protect both product and machinery, an Eriez Permanent Grate magnet was installed in the feed hopper of a Raymond mill. It has proved very efficient; the foreman insists he would not run his mills without it. Eriez Grate magnets are so successful at removing fine bits of metal from free-flowing processing lines, that a recent quality-control test by an independent laboratory showed a single Eriez magnet removed 93% of 100-200 mesh iron.

ERIEZ DRUM MAKES BORING JOB PAY OFF. W. F. Jobbins Co., Aurora, Ill., recently solved a problem that was both expensive and troublesome. Valuable aluminum chips were being lost in iron tailings. Previously, the tailings were collected during the week and re-run on a double deck separator on the weekend, in order to salvage the aluminum from the waste tailings. Now, with an Eriez Permanent Magnetic Drum, the tailings are so free of aluminum there's no need to re-run them. This process saves 4 to 8 man hours daily. The magnet functions so efficiently, the company reports, that loss of aluminum to iron tailings is less than lab figures show it should be! Want to know what an Eriez Drum can do for you? Request 6-page Bulletin B-601.

ERIEZ HI-POWR

Eriez' free booklet "Magnetic Ideas" can help you. Send for it without obligation. Address: Eriez Manufacturing Company, 70A Magnet Drive, Erie, Pa. Or, on your specific request Eriez' factory-trained field men backed by Eriez' laboratory and engineering know-how will be happy to study your particular problem, make a plant survey and offer helpful "Magnetic Ideas".

AIM to save packaging

Bundling cans with Acme Steel Strapping assures 50% faster assembly, better securement, safer shipments. Idea No. S2-4

The F-1 Strapping machine automatically tensions, cuts and welds Steelstrap for faster production line packaging. Idea No. S4-1.

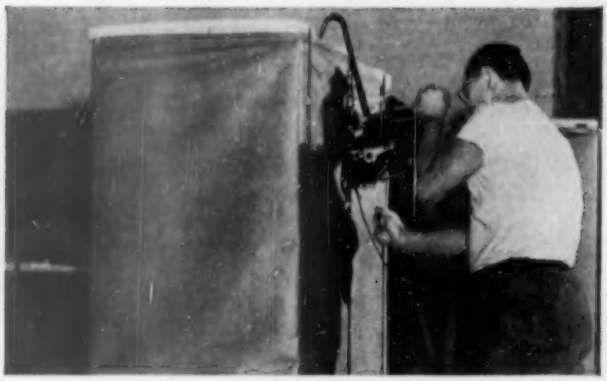
Better securement with steel strapping permits safe, more economical shipment of water heaters. Idea No. U1-1.

To realize more floor storage space, containers are assembled, and wire stitched as needed. Idea No. W1-6.

Fastening motors to wood bases with steel strapping resulted in a 10% saving in time and labor. Idea No. S7-6.

and shipping costs with these

Acme Steel ideas



Skids of paper are protectively wrapped and securely banded with steel strapping for shipment. Idea No. 53-12.

The Acme Steel Silverstitcher speeds carton assembly, gives in-transit protection of tacks and nails. Idea No. W1-2.

Acme Steel Strapping and Stitching ideas like these are but a few of hundreds that could conceivably work profits for you. They assure faster handling, less material expense, better use of warehouse space, better product protection and safe delivery.

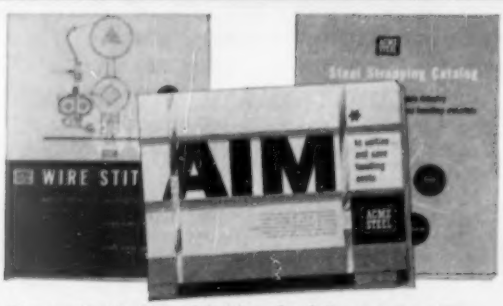
Today, perhaps now, an Acme Idea Man is analyzing the packaging, handling and shipping methods of a company somewhere near you. His training, experience and ability to adapt wire stitching and steel strapping methods to your packaging operation are available to you without obligation. Why don't you get a free analysis now. Your Acme Idea Man will observe present methods, demonstrate Acme Steel equipment and recommend the best systems for you. Call him at your nearest Acme Steel office listed in the classified directory. Or send the coupon below for further information.

ask your *Acme Idea Man to help solve your problems

ACME STEEL PRODUCTS DIVISION

ACME STEEL COMPANY

2840 Archer Avenue, Chicago 8, Illinois



These valuable Wire Stitching, Steel Strapping and Unitizing Books are yours free. Each describes scores of profitable cost cutting, time saving ideas made possible through the use of Acme Steel tools, materials and the ingenuity of an Acme Idea Man. Send today!

ACME STEEL PRODUCTS DIVISION, Dept. DE-16
Acme Steel Company
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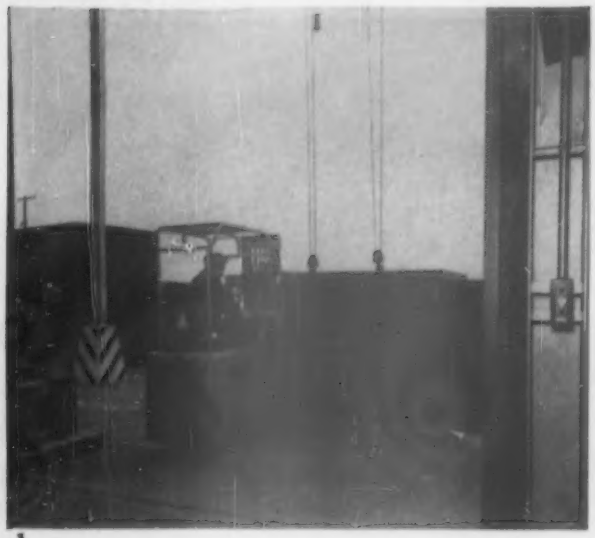
Please send the new Acme Steel ☐ Wire Stitching Catalog ☐ Steel Strapping Catalog ☐ Unitizing Book ☐ Have an Acme Idea Man call

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____



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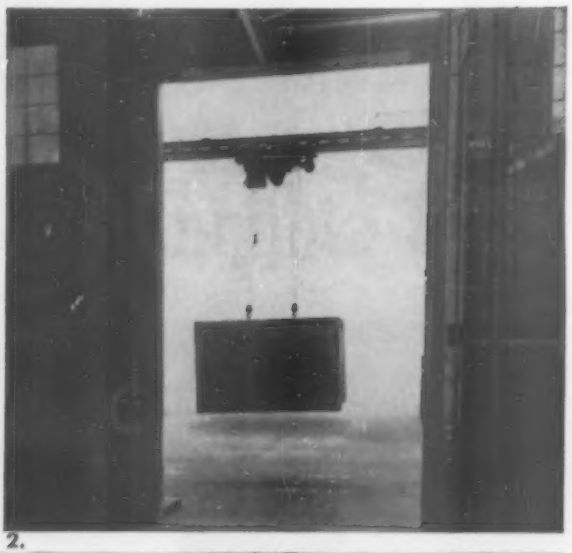


2.

1. Loading carrier van with power truck.
2. Up she goes. Depressing wall button sends carrier on its way.
3. En route to another building.

3.

Robot Carrier Delivers Materials Automatically

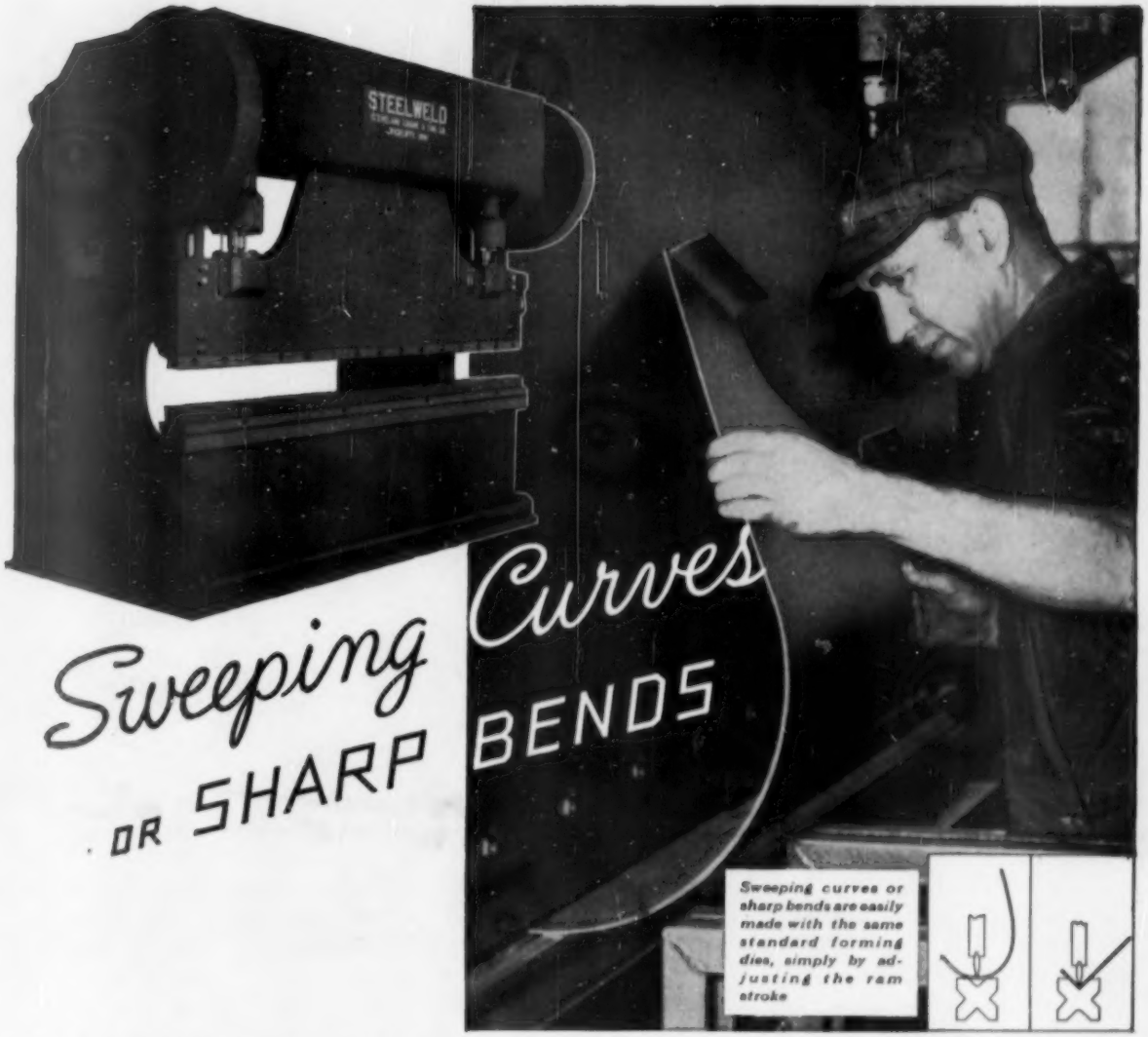
WITH a Cleveland Tramrail Robot Carrier, it is no problem to move materials between buildings. Heavy loads can be dispatched great distances without operators, safely, at low cost. The equipment opens and closes doors, if necessary, and stops automatically upon reaching the selected delivery point.

Cleveland Tramrail has developed a wide variety of automatic materials handling equipment which is now in service providing tremendous savings.

GET THIS SPECIAL REPORT
Write us for your free copy of "AUTOMATIC DISPATCH PORTFOLIO" Gives data on a variety of cost-reducing automatic handling installations.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3209 EAST 290TH ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT


STEELWELD
Sweeping Curves
OR SHARP BENDS
Sweeping curves or sharp bends are easily made with the same standard forming dies, simply by adjusting the ram stroke

For decades plate has been sharply bent — or curved — corrugated — punched — and formed into various shapes. But can you think of any ONE method or machine prior to the development of the bending press, that could perform all of these operations speedily and easily?

In this modern world where efficiency is becoming ever more important, no one working with plate in thickness up to an inch can afford to be without a bending press. As applied to metal forming, it is a lathe, a shaper, a planer, a boring mill and drill press, all rolled up into one.

Sweeping curves and sharp bends are only a few of the many operations that can be performed on a Steelweld. With dies available, and simple ones that are easily made, the kinds of work that can be produced are practically limitless.

Now, more than ever before, it is important that you be keyed up to do all kinds of forming work with dispatch and accuracy. We urge you to get the facts on this modern tool.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

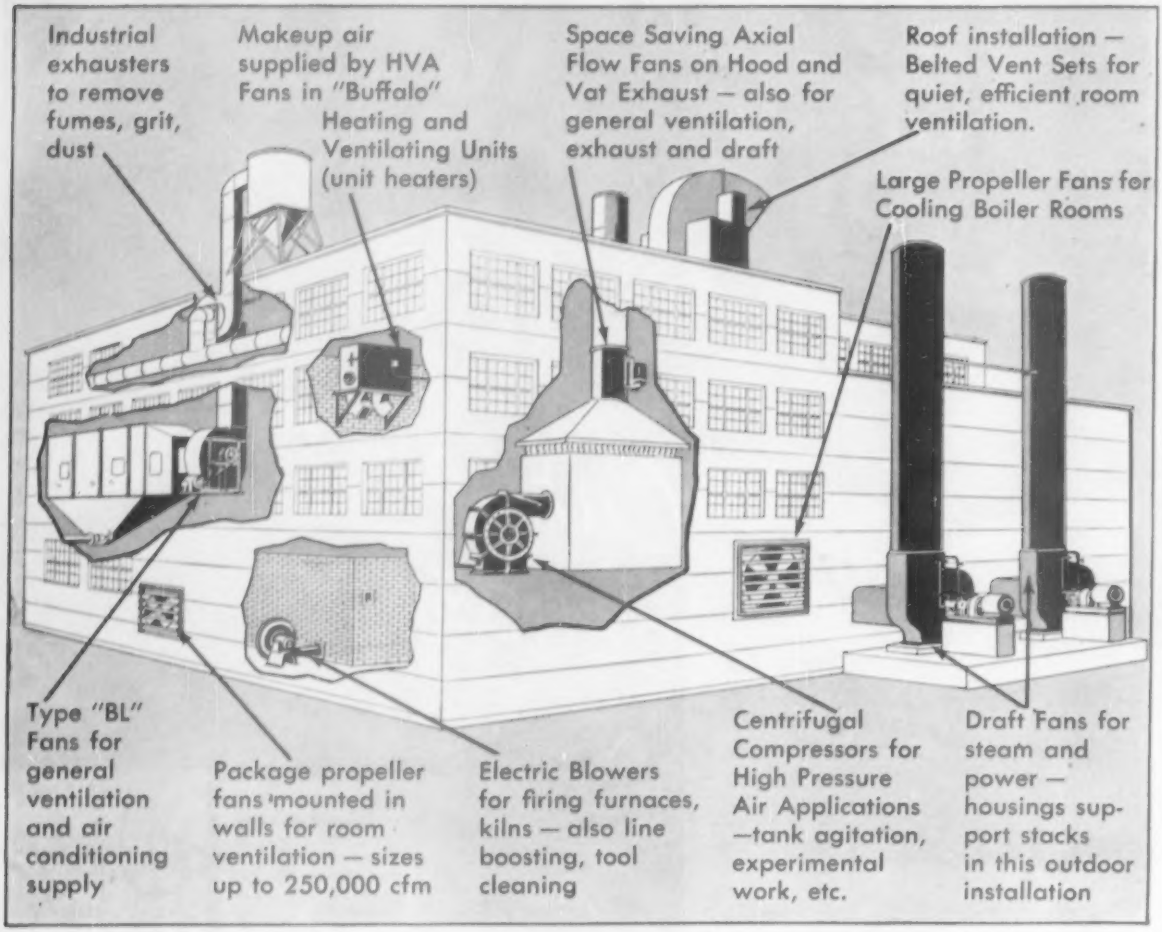
3202 EAST 281ST STREET, WICKLIFFE, OHIO

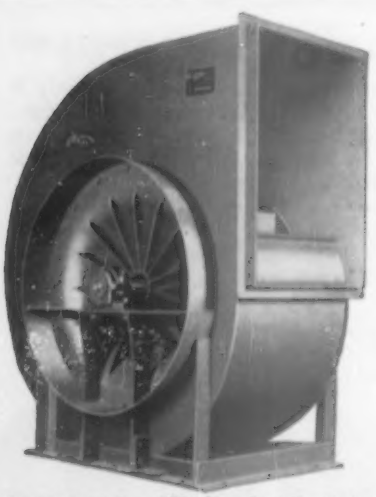
STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

AIR . . . BREATH-OF-LIFE FOR THE PLANT!


Industrial exhausters to remove fumes, grit, dust
Makeup air supplied by HVA Fans in "Buffalo" Heating and Ventilating Units (unit heaters)
Space Saving Axial Flow Fans on Hood and Vat Exhaust — also for general ventilation, exhaust and draft
Roof installation — Belted Vent Sets for quiet, efficient room ventilation.
Large Propeller Fans for Cooling Boiler Rooms
Type "BL" Fans for general ventilation and air conditioning supply
Package propeller fans mounted in walls for room ventilation — sizes up to 250,000 cfm
Electric Blowers for firing furnaces, kilns — also line boosting, tool cleaning
Centrifugal Compressors for High Pressure Air Applications —tank agitation, experimental work, etc.
Draft Fans for steam and power — housings support stacks in this outdoor installation



The "Buffalo" Type "BL" Limit-Load Ventilating Fan. Specified for many of the industry's largest ventilating and air conditioning jobs, it is the finest fan we have ever offered. Available in closely graduated capacities from 1000 cfm to 500,000 cfm. Write for Bulletin F-100 for full details.

. . . supplied EFFICIENTLY by "Buffalo" FANS

INDUSTRY'S CHOICE FOR 78 YEARS

Whatever your product, air goes into it! The air that makes workers more alert and productive — the air that gives you efficient combustion — the air that's used to remove undesirable substances — the air you warm with or cool with — is your plant's breath-of-life.

Above are just a few of the ways in which "Buffalo" Fans help a plant to breathe. There's a fan in this complete line for any job you may have for air. And it's well to remember that all makes of fans are *not* alike. There's a great deal to the science of making a fan that will give you permanently good performance. From our 78 years, we know what's practical and what isn't — what must go into a fan. We call it the "Q" Factor* — the "extra" that makes the user glad he specified "Buffalo".

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

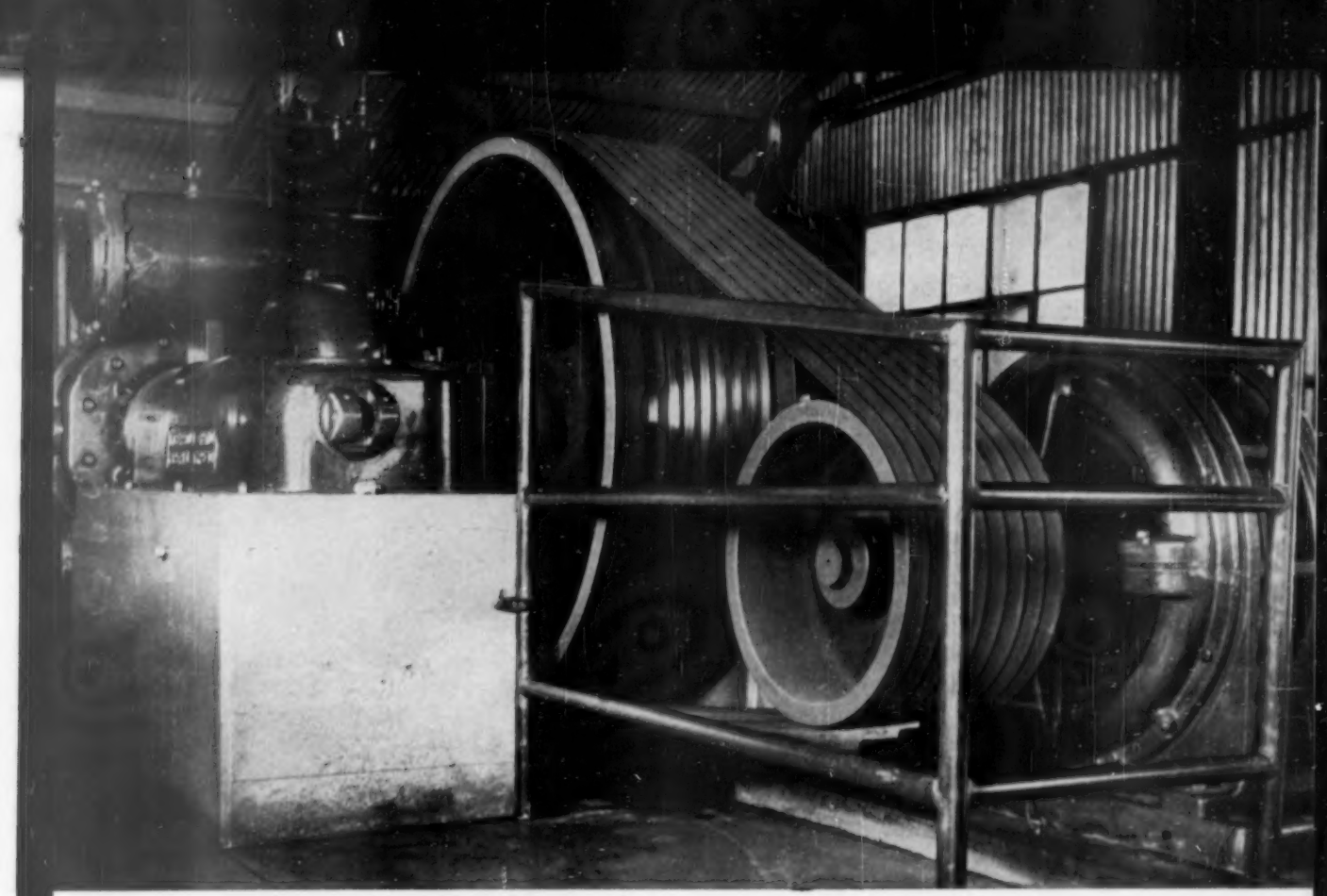
471 BROADWAY BUFFALO, N. Y.

Publishers of "FAN ENGINEERING" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

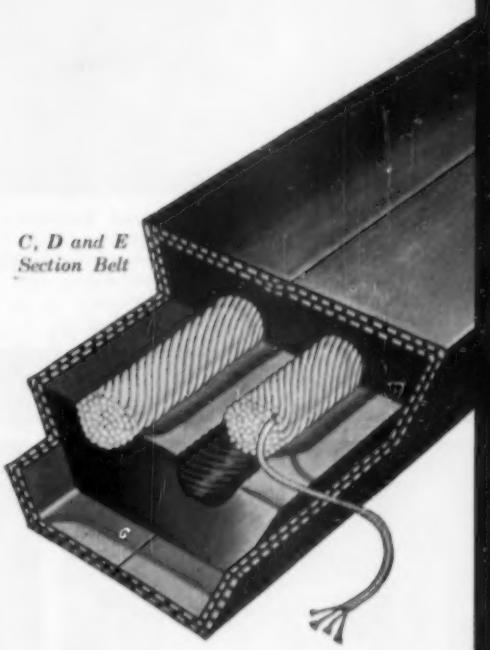
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING



Thermoid Multi-V Belts cut operating costs

There's a Thermoid V-Belt for every plant application. Every belt is *pre-stretched* to provide longer service and maximum power transmission without slippage. Thermoid C, D and E sections are rayon-grommeted for brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that resists moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . cut your operating costs with Thermoid Multi-V Belts. To meet the exacting requirements of any plant service, your Thermoid Distributor carries a complete line of Thermoid Multi-V Belts, Hose and Conveyor Belting. Call him or write direct for complete information.



C, D and E Section Belt

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

TEAMWORK of large and small business is responsible for the present prosperity of both. Here, owners Frank, George and Harmon Hugo (left to right) check vital jet engine part with Arnold Armstrong before delivery to General Electric Plant at Evendale, Ohio.

SPECIALLY BUILT OVEN at Portland Copper raises temperatures as high as 2400°—one of many metal treating facilities available at Portland plant.

QUALITY CONTROL has been a major factor in building the firm's reputation. Here, Albert Kozick checks X-ray of special weld for flaws —standard procedure on all jet engine work.

DIVERSITY OF OPERATION—now over 40% non-defense—is typified by new, fabricated aluminum toll booth doors ordered for new Maine Turnpike.

SKILLS LEARNED AS A G-E DEFENSE SUBCONTRACTOR PROVE VALUABLE TO OTHER INDUSTRIES

Portland Copper's success story underlines interdependence of large and small business

The Portland Copper & Tank Works, Inc., like many small businesses, started with virtually nothing but the personal skills of its owner—in this case a coppersmith who had left Russia in 1909 to seek greater opportunities in the United States. Morris Hugo opened a tiny metal-working plant which existed precariously—with a top gross of only $12,000—until World War II. Then, with ship repair work for the Navy and the U. S. Maritime Commission in 1943, yearly sales abruptly soared to $250,000.

Defense skills developed. After the war the company moved to larger quarters in South Portland, Maine, and built up its reputation as a fabricator of stainless steel, aluminum, and special high-temperature alloys. General Electric entered the picture in 1949 with an order for afterburners for J47 jet engines.

Big business helps small business. The Maine firm quickly proved its ability in precision manufacture, made prompt deliveries. And G.E., well-satisfied with the work, soon became Portland Copper's largest customer. As one of more than 17,000 G-E subcontractors and suppliers in the past 5 years, the Portland firm has *continued* to expand in other non-defense areas: pulp, paper, textiles, chemical and petroleum industries. It now grosses better than $5,000,000 annually, reports an employee roster of 423—as compared with 100 in 1949.

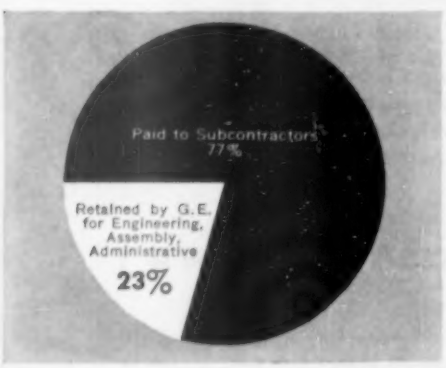
Contributes to nation's production. This success story dramatizes once more the interdependence of large and small business—and how such a system operates for the benefit of both. General Electric has gained essential services and jet engine components needed to help build up the nation's defense. Portland has acquired new skills and facilities which now make the firm valuable to other manufacturers in our expanding national economy. 649-5

INTRICATE FABRICATION is one of more difficult operations Portland performs successfully. Here R. L. Clark checks stainless steel section of a powerful G-E gas turbine.

NEW SKILLS learned as a G-E defense subcontractor are now applied to a variety of jobs for other manufacturers. Typical is this precision welding by Portland Copper and Tank personnel on aluminum panel assembly.

Progress Is Our Most Important Product

GENERAL ELECTRIC



SUBCONTRACTORS who helped G.E. build the J47-GE-25 during the Korean War got 77 cents of every dollar government paid General Electric for engine.

Can Small Business Help You?

Thousands of small businesses, like Portland Copper and Tank, have furnished General Electric with practically every kind of skill and service as defense subcontractors and suppliers.

Many of these companies have available production capacity, created in large part by the reduction of defense orders since the Korean War peak. This means that they may be able to apply their skills to help you with your production.

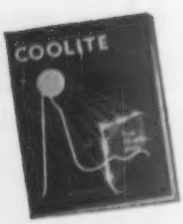
If you have a manufacturing problem or have work available for subcontracting, please write us on your letterhead stating in as much detail as possible the type of services or skills you require. We will be glad to suggest several small businesses who have done similar work for us and may be able to help you.

Write to C. W. Bryant, Manufacturing Services Division, General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Western Electric Company and Pacific Telephone and Telegraph Company Building, San Leandro, California.
Harry A. Thomsen & Aleck L. Wilson, Architects • Swinerton & Walberg Co., Contractor • East Bay Glass Company, Glazier

Coolite Glass Keeps Production in Better Sight in New California Supplies Center of Pacific Telephone and Western Electric

Mississippi's Coolite wire glass, used in this modern plant, keeps work areas and offices literally loaded with daylight . . . provides plenty of conditioned, natural illumination for easier seeing, greater comfort and added safety. For Coolite, Heat Absorbing, Glare Reducing glass permits use of vast areas of glass without distracting, discomforting glare . . . absorbs up to 50% of solar heat rays to eliminate unwanted heat. The attractive Luxlite pattern diffuses softened daylight deep into interiors, avoids harsh shadows and sharp contrasts. Workers see better, feel better, work better in Coolite-conditioned daylighting. Brighten your production picture with Coolite. When you build or remodel your facilities, consider Coolite. Find out how Coolite, Heat Absorbing, Glare Reducing glass can keep costs down, boost employee efficiency, lighten load on humidification and air conditioning equipment.



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Address Dept. 11,

Translucent, light diffusing glass by Mississippi is available in a wide variety of patterns and surface finishes, wired and unwired, all "visioneered" to meet any daylighting requirement. Available through leading distributors of quality glass everywhere.

Sweet's

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. NEW YORK • CHICAGO
SAINT LOUIS 7, MO. FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

STANOIL *Industrial Oil delivers on tough assignment at Indianapolis Screw Products Corp.*

Rolling threads on aluminum bronze with pitch diameter tolerances as close as .0014" is a tough job but Indianapolis Screw Products Corporation is used to taking on such jobs and delivering. They give tough jobs to the hydraulic oil they use, too, and they expect it to deliver. They've given such a job to STANOIL and they're getting the results they expect—and more.

STANOIL Industrial Oil is used in the hydraulic system of a Watson-Flagg precision thread roller in the Indianapolis Screw Products Corporation plant. The system uses a Vickers pump and Cuno filter. The filter has not been cleaned in over a year *because it hasn't needed cleaning.* Here, as in other applications, STANOIL delivers top performance with minimum maintenance and maximum system cleanliness of the hydraulic system.

STANOIL likes tough assignments like this one; likes them because it can deliver with plenty to spare. Perhaps you would like to know about the use of STANOIL in a hydraulic application in your plant. In the Midwest and Rocky Mountain states, a lubrication specialist at your nearby Standard Oil office will be happy to discuss it with you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Mr. R. W. Williams, Plant Superintendent checks pitch diameter of thread with Glenn Riggs, Standard lubrication specialist. Glenn Riggs is an old hand at helping industrial firms work out lubrication problems. Glenn has been doing this sort of thing for 28 of the 30 years he's been with Standard. This background and experience, customers have found, pay off for them.

Cuno filter (left) remains clean after more than year filtering STANOIL. Vickers pump on Watson-Flagg Thread Roll machine (right). Good housekeeping and STANOIL team to give top performance in this hydraulic system.

STANDARD

STANDARD OIL COMPANY

(Indiana)

K-P WIRE MESH

are Stronger—Last Longer

When heat, moisture, abrasion and corrosion are factors in your operation, you'll find KORB-PETTIT woven wire mesh conveyor belts are best . . . they provide longer wear and economical trouble-free operation.

VERSATILITY AND DURABILITY

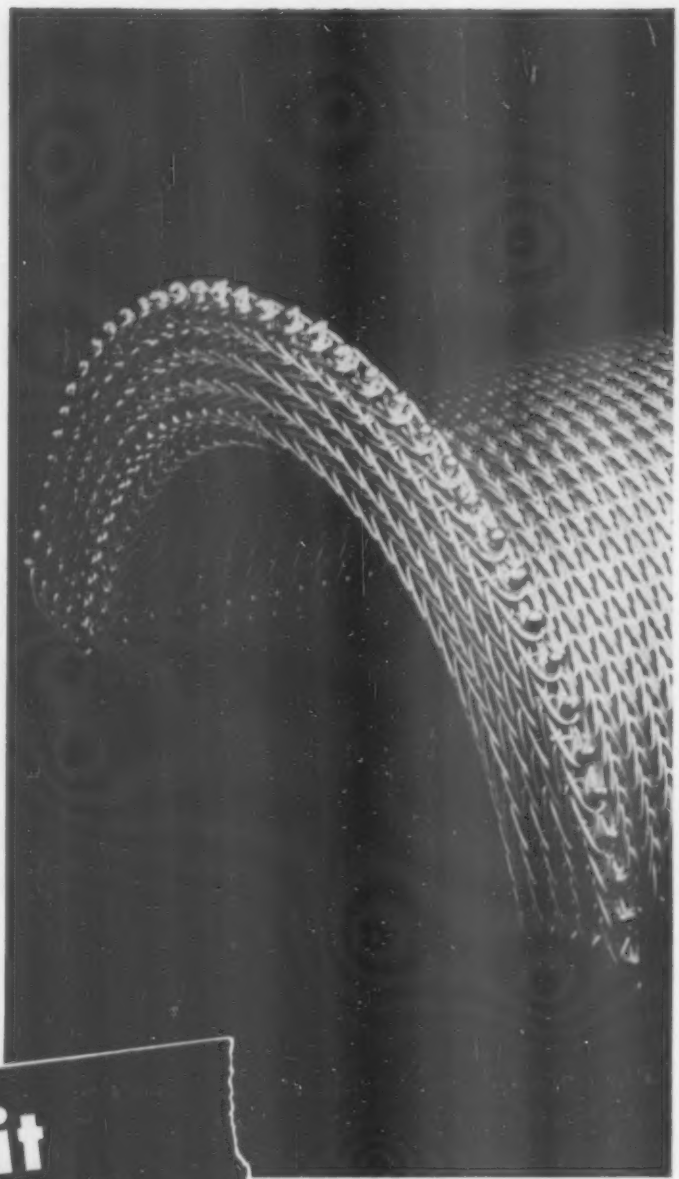
K-P woven wire mesh belts are custom-tailored to your job. Made of special corrosion-resisting alloy wire, they offer a wide range of strengths, mesh openings, flexibilities, etc. for nearly every conveying job from meat packing to metal finishing.

TEMPERATURE—Ideal for operating at extreme temperatures where other belting materials are impractical. K-P belts are in use for such diverse applications as brazing copper at 2100° F. and quick freezing foods at –50° F.

FLEXIBILITY—Single conveyor production lines can be adapted to nearly any plant structure with ease because of the inherent flexibility of wire mesh weave.

LOW MAINTENANCE COST—With proper lubrication, replacement of even minor parts is seldom necessary. Through the use of various alloy wires, high corrosion resistance and chemical stability are attained where chemical and physical reaction might otherwise materially shorten the life of a belt. As a result, cost of replacement repairs are kept to a minimum.

If you've a conveyor problem, let a KORB-PETTIT man examine your operation. K-P engineers will do the complete job: specifications, design, fabrication, installation and service—of a single belt or an entire conveyor system, as the job requires.



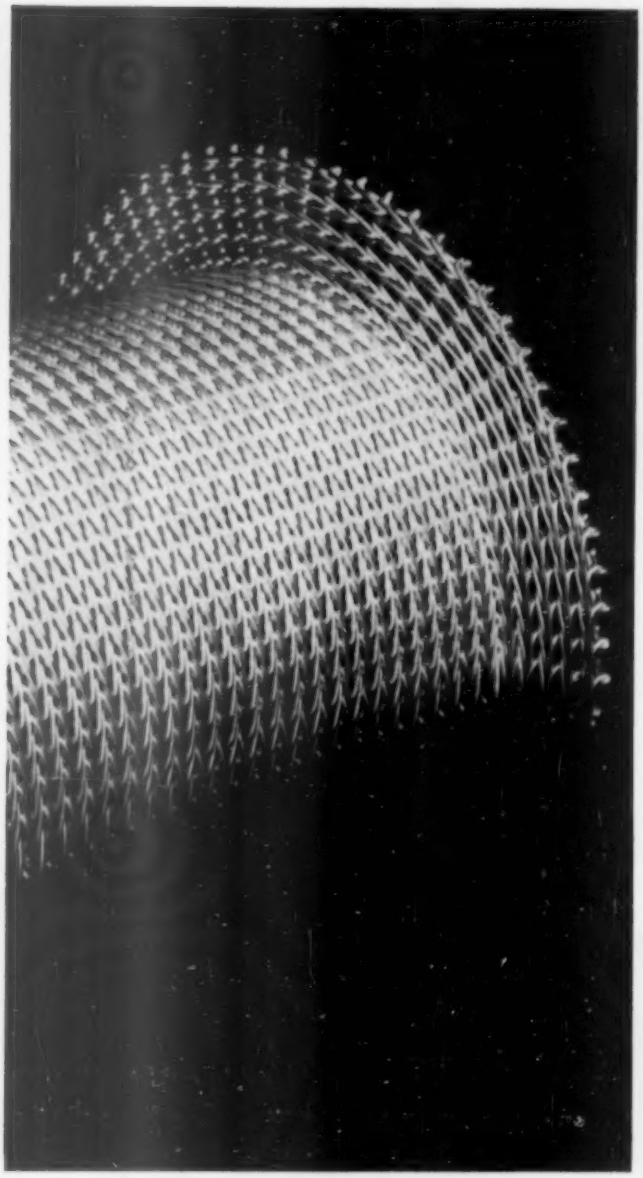
Korb-Pettit

WIRE FABRICS AND IRON WORKS, INC.

1505-15 North Mascher Street, Philadelphia 22, Pa.

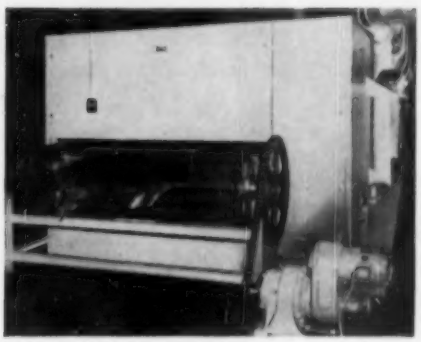
A SUBSIDIARY OF

CONVEYOR BELTS
on the Job!



Industry Case History

KORB-PETTIT Wire Mesh Conveyor Provides 8 Years of Maintenance-Free Operation



In August 1947, one of the nation's largest leather specialty houses requested Korb-Pettit to design and install a convection type leather dryer.

After a thorough examination of the customer's requirements, i.e., problems of heat, load factors, chemical reaction, speed, etc., our engineers recommended the unit shown above. It features a 6-foot wide balanced spiral weave belt with a 1" balanced weave mesh, using #10 wire of specified strength and chemical stability.

The performance has been outstanding . . . absolutely *no* maintenance expense, beyond normal lubrication and cleaning, or parts replacement during 8 years of constant operation.

HEWITT-ROBINS INCORPORATED

EXECUTIVE OFFICES—STAMFORD, CONNECTICUT

Up to 40% higher tightening torques — a feature of new High-Torque Unbrako socket set screws

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES
(Inch-Pounds)

SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

Compare UNBRAKO-recommended tightening torques with those of ordinary socket set screws and you readily see why you can set an UNBRAKO and then forget it. The reasons are simple. UNBRAKOS have deeper sockets, which give you better purchase with the wrench; rounded socket corners, which eliminate the sharp corners where cracks start; fully formed threads, which make them stronger; and knurled cup points, which keep them tight.

Let's see just how the development of fully formed threads make the new High-Torque UNBRAKO stronger. The metal is compressed into the closely knit grain structure that you see in the illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. An UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Conversely, cut or ground threads have straight flow lines—lose thread form at root diameter.

You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your authorized distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 11, Pa.

STANDARD PRESSED STEEL CO.
UNBRAKO® SOCKET SCREW DIVISION SPS
JENKINTOWN PENNSYLVANIA

UNBRAKO SET SCREW THREADS

ORDINARY SET SCREW THREADS

Masks

Conforming Matrix spray painting masks withstand thousands of applications, a complete year's run of high production. Plug-type keeps depressed areas clear while spraying background; lip-type protects background while painting depressed areas; block-cutout, plano-surface type coats restricted area for fast wiping operation; cap-type protects raised design while painting background.

Fixtures

Standard and special clamps and pressure fixtures hold mask and part firmly in position during spraying to assure exact registration. Reduce rejects, lengthen mask life, and speed production by freeing both hands for productive movement. Usually cost less than hand-made mechanical devices of questionable efficiency.

PRODUCT DEVELOPMENTS BY CONFORMING MATRIX

Mask Washing Machines

50% faster than any other mask washer. Avert costly production delays due to damaging of the fine wire bridging by hand scrubbing. Low solvent consumption. One company reports the consumption of only two gallons per eight hours.

Don't

LET OLD FASHIONED, OBSOLETE METHODS OF SPRAY DECORATING STEAL YOUR PROFITS!

Cut finishing costs. Greatly increase production with Conforming Matrix spray masks, fixtures, automatic machines and mask washers. Send prints or sample parts, giving production requirements and results desired. Recommendations as to the most efficient technique for handling your particular requirements incur no obligation.

Automatic machines permit increased production rates in intricate spray mask decoration, by as much as hundreds to one, over hand methods. Radically reduce labor costs and eliminate the need of experienced workmen. Rejects, common with careless or inexperienced hand spraying, are practically eliminated. Conforming Matrix builds a number of very flexible automatic machines, each can be manufactured to meet your specific requirements.

OSCILLATING GUN PRESSURE CONTACT PAINTING MACHINE

The only machine which permits the gun to operate in a stationary position as well as in a concave arc, or pendulum-type swing. Completely air operated.

The cam controlling the oscillating stroke is adjustable and can paint areas up to 11" x 8". Self-contained and completely enclosed. The paint cycle is actuated by downward movement of the piece part and mask. Working mechanism completely covered from overspray. The oscillating mechanism is fully adjustable as well as spray gun and paint cycle. Only 900 C.F.M. required to exhaust. ¼ H.P. is sufficient. Installation of machine requires only the connection of an exhaust, compressed air, and paint tank.

On demonstration production runs for final customer approval, the following production rates were obtained: Plastic toys, 900 pieces per hour. Automotive transparent lacquers applied to horn buttons, 600 pieces per hour. Automotive die cast tail light bezels 450, plastic auto radio dials, 1300 pieces per hour, die cast escutcheons 700 per hour.

CONFORMING MATRIX CORPORATION

420 Toledo Factories Building — Toledo 2, Ohio

Please send without obligation, details on

☐ ***Masks;*** ☐ ***Fixtures;*** ☐ ***Mask Washing Machines;*** ☐ ***Automatic Machines.***

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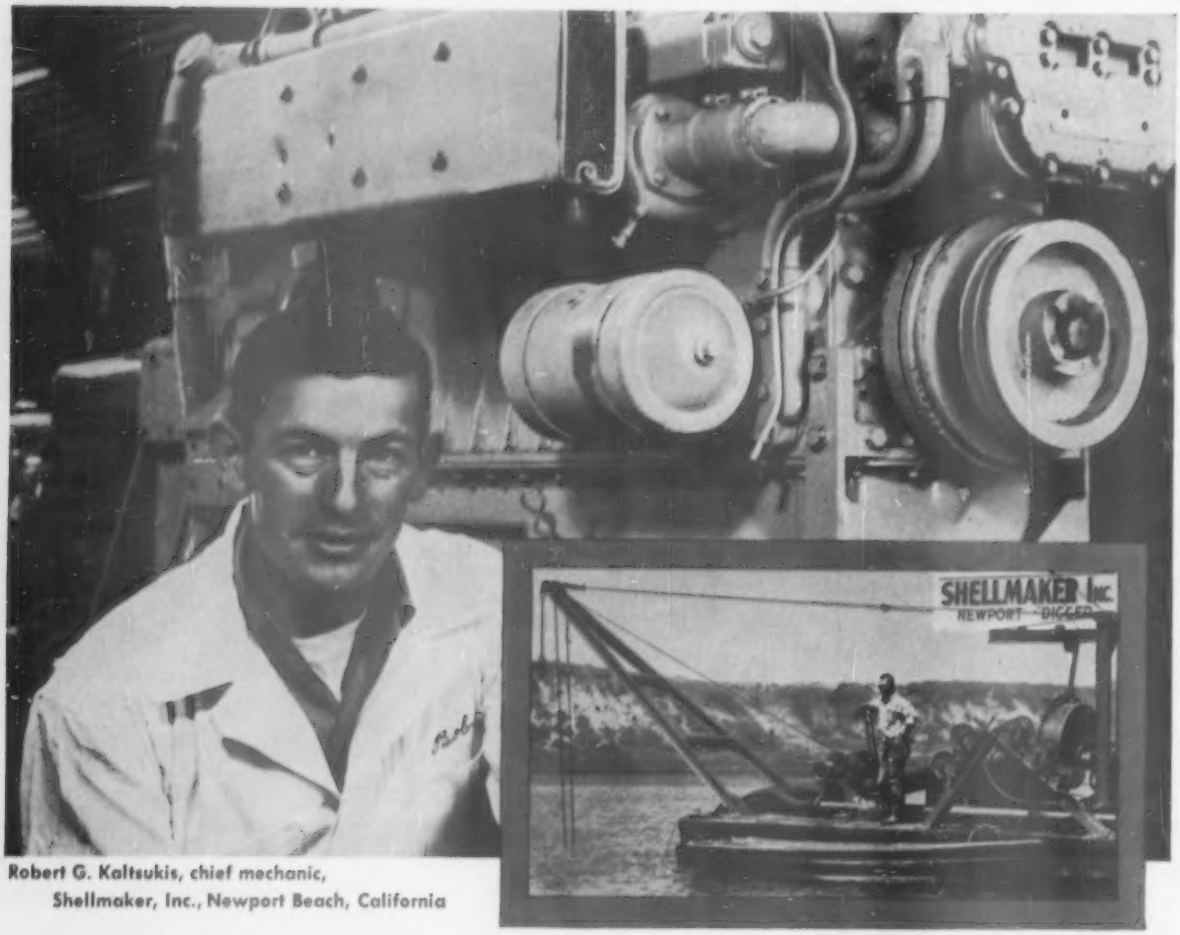
"After 3931 hours on T5X ...engine factory-clean"



Robert G. Kaltsukis, chief mechanic, Shellmaker, Inc., Newport Beach, California

"Keeping 22 GMC diesel and 20 gas engines on the job is my responsibility. That's why I keep their crankcases filled with the motor oil I know *holds up best*... Union's T5X.

"In the five years we've been using T5X exclusively none of our engines has ever lost a bearing, and, believe me, we work 'em hard dredging as much as 160 yards of material per hour. But even though we operate our engines continuously at close to capacity we *do* follow strict maintenance policies. We change oil and filters every 100 hours, service every 2500 hours and our records show how well good oil and scheduled maintenance pay off.

"Take this GMC 671 with the 70 injectors, for instance — we had occasion to tear it down for inspection recently. After 3931 hours on T5X the interior of this engine looked factory-clean, and the coating on the bearings had not yet worn off. No oil I know of equals T5X for keeping engines looking so clean and new."

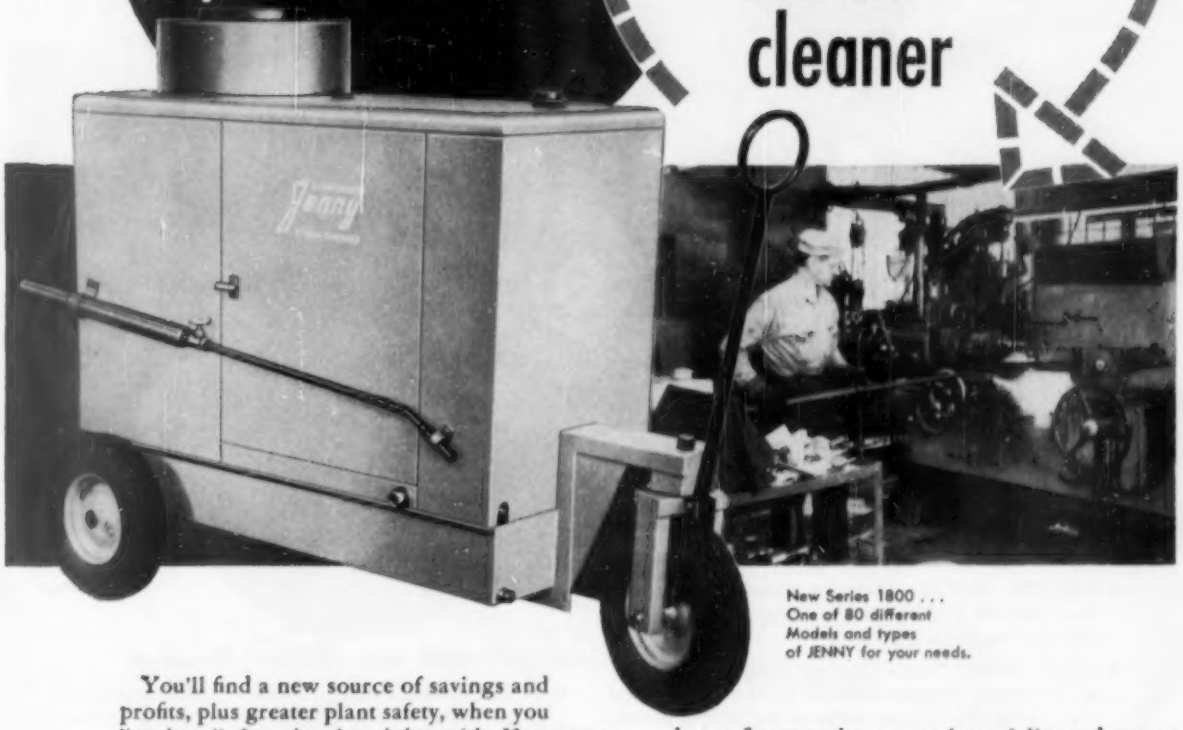
Bob Kaltsukis' experience with Union's T5X Motor Oil is not unique. It's being used in thousands of diesel and gas engines with similarly remarkable results. Ask your nearby Union Oil representative to start supplying you with T5X, the *amazing* purple motor oil.

UNION OIL COMPANY OF CALIFORNIA

Los Angeles: Union Oil Bldg. • New York: 45 Rockefeller Plaza • Chicago: 1612 Bankers Bldg. • New Orleans: 644 National Bank of Commerce Bldg. • Atlanta: 401 Atlanta National Bldg. • Kansas City, Mo.: 612 W. 47th St.

tool up FOR YOUR cleaning jobs... ...prevent fires

with HYPRESSURE Jenny steam cleaner



New Series 1800 . . .
One of 80 different
Models and types
of JENNY for your needs.

You'll find a new source of savings and profits, plus greater plant safety, when you "tool up" for cleaning jobs with Hypressure Jenny Steam Cleaner. Jenny removes grease, cutting oils, and protective coatings from machinery, equipment, sub-assemblies, and castings, before repair, repainting or machining—and does it ten times faster than by ordinary methods! It promotes safety by eliminating the fire hazard of greasy conveyor chains and floors, and the use of inflammable cleaning solvents. It cleans ribbed glass windows for better illumination; keeps floors and runways free of dirt and grease for safer, faster plant traffic. Jenny steam cleaning often reveals damaged or worn parts for repair before costly production delays or breakdowns occur. In fact, Jenny does most any cleaning job for one-tenth the cost of cleaning by hand. So find out how easy it is to bring these savings and safety to your plant.

Mail the coupon today for full facts.
No obligation.

HYPRESSURE JENNY DIVISION

HOMESTEAD
VALVE MANUFACTURING COMPANY
"Serving Since 1892"
P.O. BOX 86 CORAOPOLIS, PA.

Please send information
on Hypressure Jenny to:

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Company _____

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ANNOUNCING

New Keller Portable Air Drills!

with 10 outstanding features that production men know will increase output . . . reduce costs.

- **MORE POWER**—Newly designed side air intake and exhaust porting provide for greatly increased power. Capacities up to ¼"—5/16".
- **LIGHTER WEIGHT**—Advanced engineering enables weight reduction along with greater power.
- **GREATER RANGE**—Provides speed-torque range from 600 to 17,000 rpm to meet practically all drilling requirements.
- **QUIET OPERATION**—Quietest drill with adjustable exhaust deflectors. Noise level is reduced by controlling the exhaust without sacrificing power. Operator fatigue caused by high noise level is minimized.
- **BALANCED DESIGN**—Shape provides utmost operator comfort and ease of handling.
- **SMALL SIZE**—Body diameter only 1½" with ¾" spindle offset.
- **SUSPENSION BAIL**—Standard equipment.
- **INTERCHANGEABLE PARTS**—Interchangeable gears, spindles, and chucks afford quick conversion to new jobs.
- **ONE-SHOT LUBRICATION**—With flush type fitting.
- **LOW AIR CONSUMPTION**—Side air intake and large exhaust parts provide low air consumption and more efficient operation.

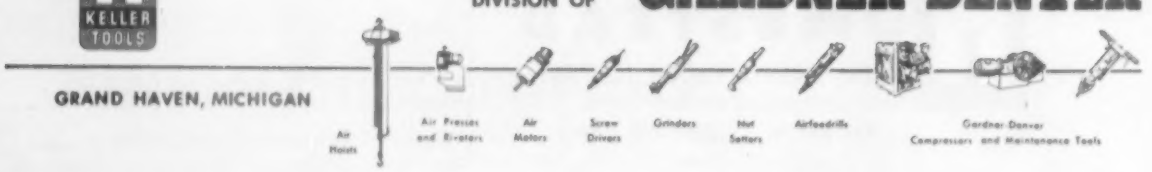
Write for Bulletin 11A giving complete information about these all-new KELLER Air Drills.

GARDNER-DENVER Since 1859 — K KELLER TOOLS

KELLER TOOL

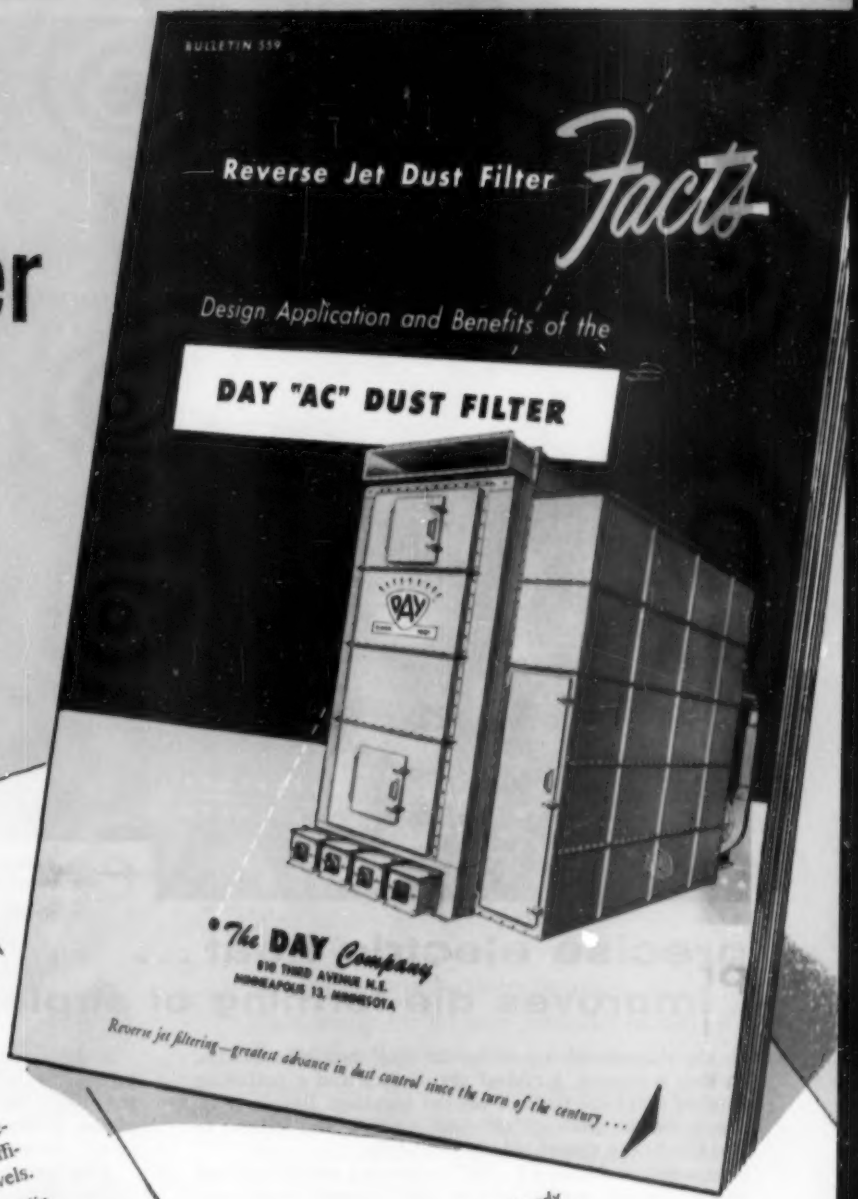
DIVISION OF **GARDNER-DENVER**

GRAND HAVEN, MICHIGAN



NEW Dust Filter FACTS...

SEND FOR YOUR FREE COPY OF THIS VALUABLE BOOK


BULLETIN 559
Reverse Jet Dust Filter Facts
Design Application and Benefits of the
DAY "AC" DUST FILTER
The DAY Company
610 THIRD AVENUE N.E.
MINNEAPOLIS 13, MINNESOTA
Reverse jet filtering—greatest advance in dust control since the turn of the century . . .

IMPROVE your knowledge of Dust Filters and Dust Control!

- Read why the Hersey reverse jet principle is the most significant improvement in dust filter design in more than half-a-century.
- Discover why self-adjusting reverse-jet cleaning rings raise dust filter efficiencies to new high performance levels.
- See for yourself how felted filter media removes sub-micron dust particles that escape woven filter fabrics.
- Compare the features and performance of various dust filters in one easy to read comparison chart.
- Profit by helpful pages of air engineering data and charts.

Free! Send today for handy reference edition, twenty-four page book on dust filters and dust control. **Request your copy now!**

DIAMOND JUBILEE 1881 1956

The DAY Company

858 Third Avenue N.E., Minneapolis 13, Minnesota
IN CANADA: P. O. Box 70R, Ft. William, Ontario
Branch Plants: Buffalo, Fort Worth, Toronto, Ontario
Representatives in Principal Cities

Diagram shows location of electric cartridge heaters in relation to die contours.

precise electric heat . . .
improves die-forming of airplane propellers

In the manufacturing of hollow steel propeller blades, by this company, a ribbed thrust face and a matching camber sheet are furnace-brazed together. Before brazing, however, the camber sheet must be die-formed to exactly fit the thrust side of the blade.

It was found that a *heated* die-forming press produced better shaped camber sheets and relieved mechanical stresses. But the temperature had to be closely controlled at a minimum of 900°F in both top and bottom halves of the die. Only electric heat could meet these difficult conditions.

So sixty-three Chromalox Electric Cartridge Heaters, of selected lengths and wattages—totaling 97,350 watts—were inserted at regular intervals in the sides of the die, as shown in the diagram. Each half of the die was divided into six heat zones . . . with a thermocouple in each zone connected to a common control panel. Heat is generated in the right amounts *within the die.*

Results are uniform, controlled heat. Relatively low initial installation cost. Cool working conditions around the press. Consistent production. And six similar sets of dies, heated by Chromalox Electric Cartridge Heaters, now in operation in this plant.

This problem-solution-result approach has enabled us to help many manufacturers produce better, faster, at lower cost.

Always available to you are our research, engineering, design, and modern manufacturing facilities. The world's largest factory stock of industrial electric heaters plus local stocks at strategic points. And a 33-city nationwide sales-engineering service.

Let us know your problem for controlled heat and we'll go all out to help you find the right answer—electrically.

A-4436

EDWIN L. WIEGAND COMPANY
7518 Thomas Boulevard, Pittsburgh 8, Pa.

check **CHROMALOX** electric heat for your application

Send for your copy of F1550—"101 Ways to apply Electric Heat."

Here's why it pays to order rubber products from your Quaker distributor

BELTING
Conveyor, Transmission or V-Belting.

HOSE
For air, water, steam, oil, suction, welding.

PACKING
Chute lining, duck and rubber packing, hydraulic packing, press pads, sheet packing.

GASKETS-MATTING

MOULDED AND EXTRUDED RUBBER PRODUCTS

- **PROVED PRODUCTS** Your Quaker—Quaker Pioneer distributor carries rubber products with a proven 'on-the-job' record of trouble-free performance—products that give you more mileage per dollar outlay for belting, hose, packing, etc.

- **PROMPT SERVICE** You can count on prompt delivery from your distributor. His large varied stocks include all standard items for your everyday needs. For your custom-made requirements, your distributor has Quakers' manufacturing facilities at his command for fast service to you.

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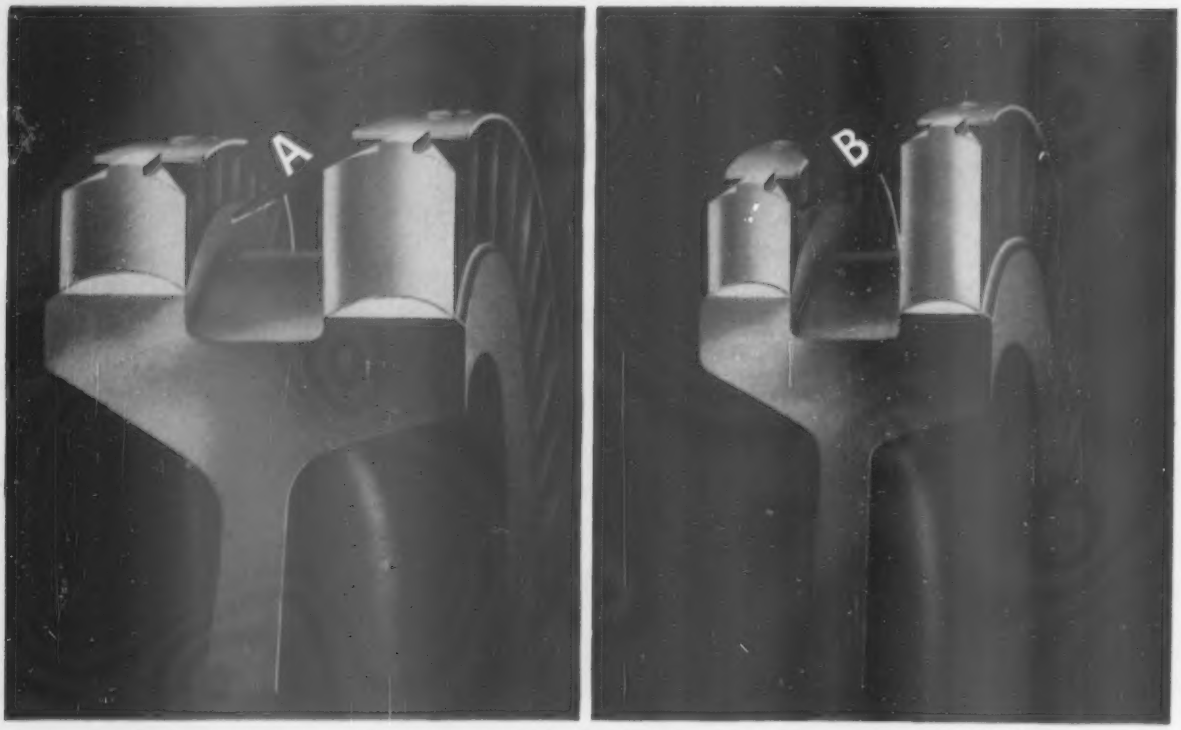

(Left, A) wide bucket "L" type wheel. (Right, B) regular type wheel for Coppus Steam Turbines

Now . . . for low steam consumption – **COPPUS TURBINES** *can be furnished with wide bucket "L" type wheel*

Good news for steam turbine users where low steam consumption is important!

The Coppus Type "L" Wheel is the answer to this problem. Larger turbine buckets are employed to make the most economical use of steam.

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TL-6 Tracto-Loader moves bulk material from a boxcar to a conveyor set up just outside car door. This 33.7 hp loader has a full half-yard bucket, yet it can scoot around in this confined area, make right-angle turns without jockeying.

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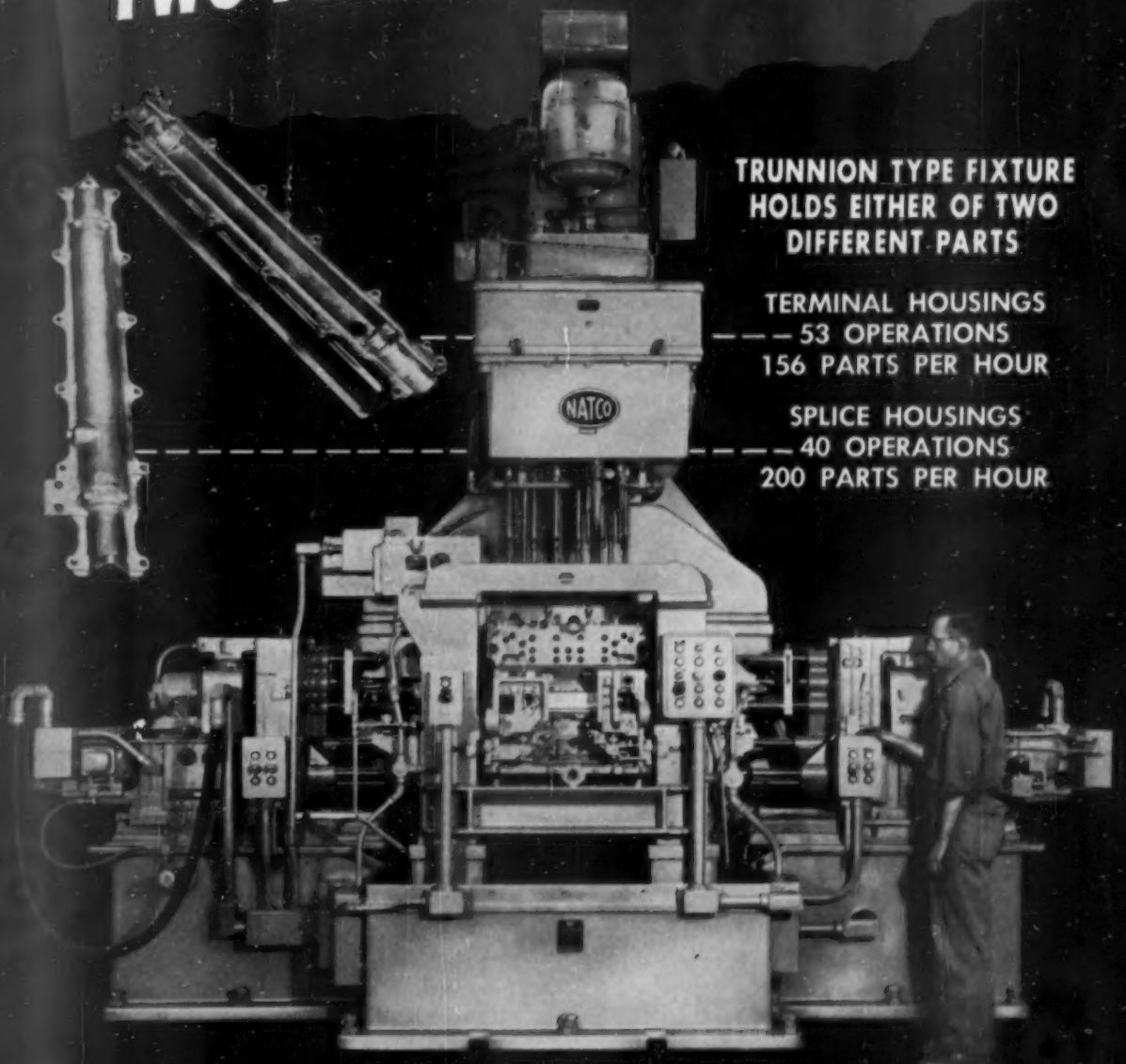

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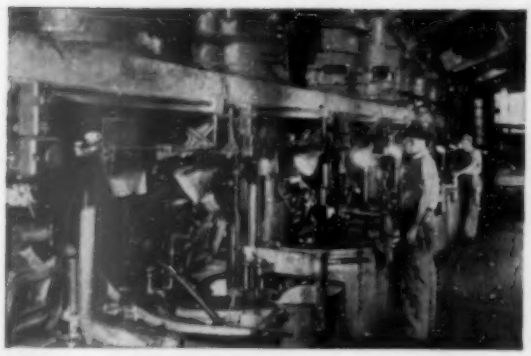

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Honeywell Controller Cost—$215.00

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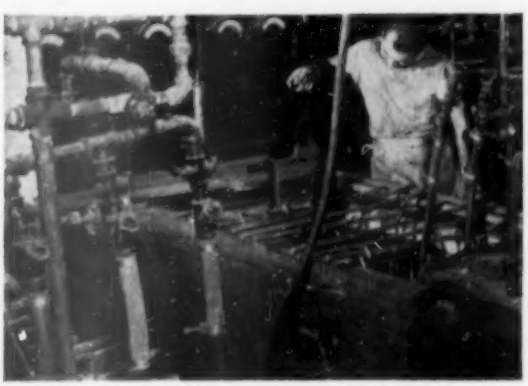

***Plating solutions** are held at correct temperature for best quality of finished electrotypes, at the Kingsboro Electrotype Corp., Brooklyn, N. Y. . . . by means of Honeywell Remote Bulb Controllers.*

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improve quality

Don't overlook these simple, low-cost controllers...they're the ideal solution to hundreds of problems.

IN PRACTICALLY any plant, there are dozens of spots where simple, inexpensive Honeywell Industrial Controls can be put to work to improve the quality of production. The examples pictured here give only a few of the ways that this versatile family of controls can regulate temperature, pressure, vacuum, liquid level and humidity . . . the variables that directly affect quality of finished goods.

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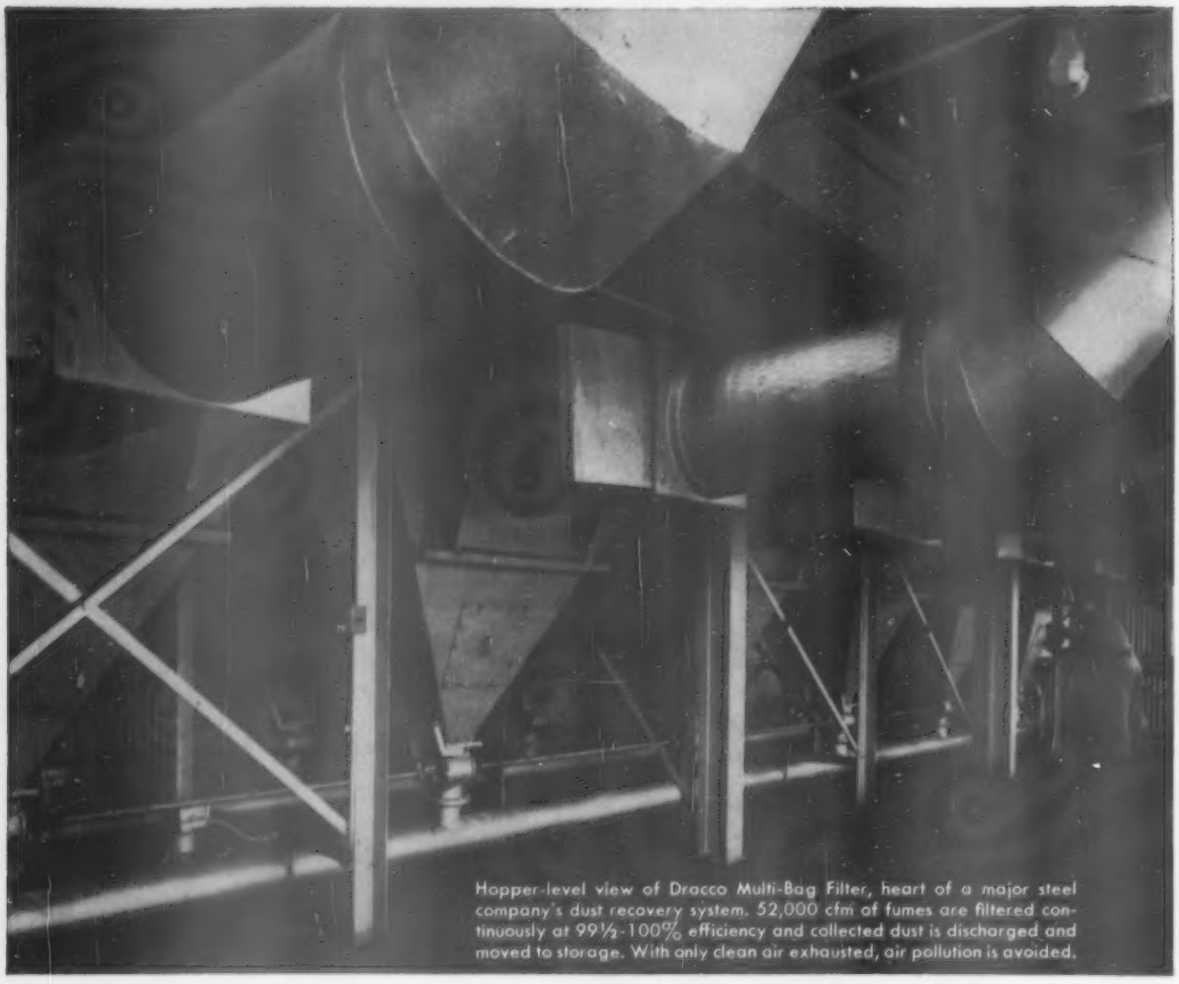

Hopper-level view of Dracco Multi-Bag Filter, heart of a major steel company's dust recovery system. 52,000 cfm of fumes are filtered continuously at 99½-100% efficiency and collected dust is discharged and moved to storage. With only clean air exhausted, air pollution is avoided.

air pollution halted...*at a profit!*

Air pollution is one of industry's biggest and most costly problems. But here's how one major steel company cleaned up a "hot" situation by controlling fumes from its secondary bronze smelter—*at a profit!*

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Looking for the accurate mechanical variable speed drive?

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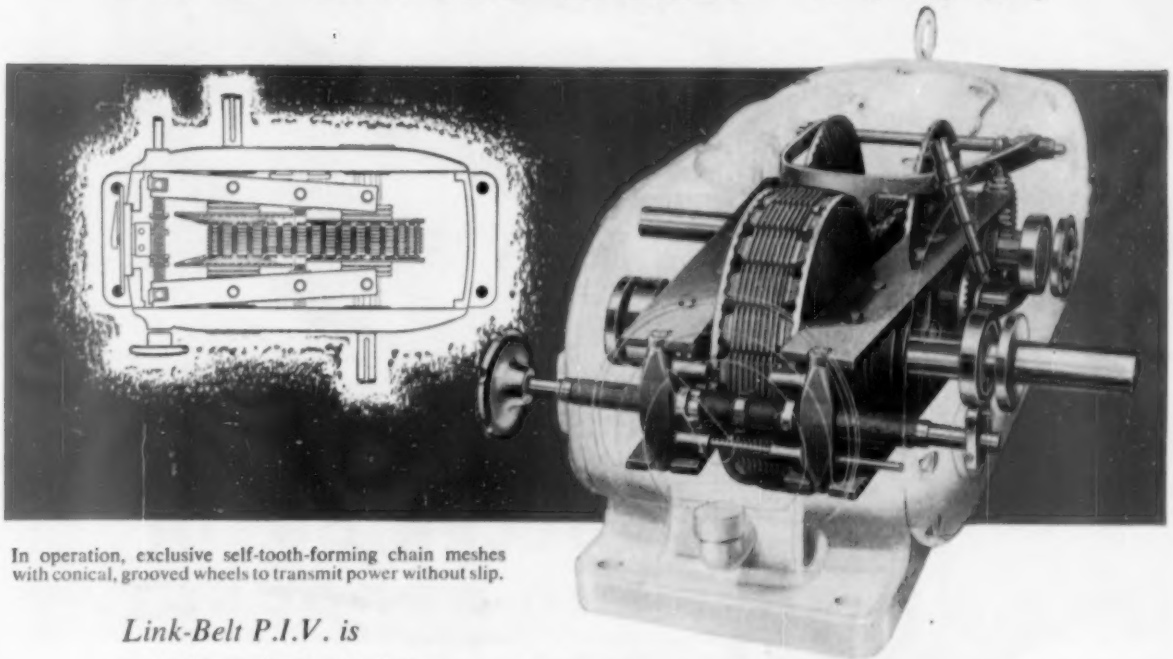


In operation, exclusive self-tooth-forming chain meshes with conical, grooved wheels to transmit power without slip.

Link-Belt P.I.V. is

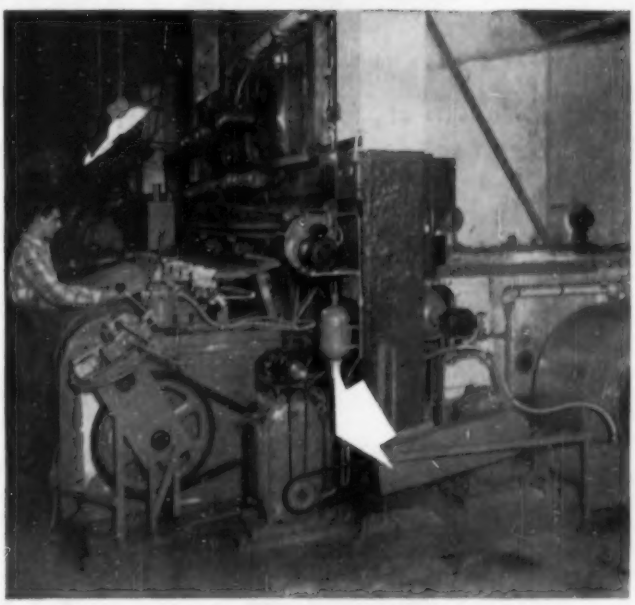
- *independent of friction*
- *all metal*
- *fully enclosed*
- *automatically lubricated*

Here is the Positive, Infinitely Variable speed drive that's not dependent on friction for transmitting power. Instead, its exclusive drive chain with self-forming metal teeth engage with radial grooves in two pairs of cone-shaped wheels. Positive power transmission is assured at all speeds regardless of load.

Movement of the single control screw simultaneously varies effective diameters of wheels on input and output shafts. This makes possible an infinite number of stepless speed adjustments within the range of the drive. Speed of the output shaft can be changed instantly, even while operating under full load.

Link-Belt P.I.V. drives are available in capacities from ½ to 25 hp . . . in 8 sizes and 16 types for horizontal and vertical mounting. See your nearest Link-Belt office or authorized stock-carrying distributor, and write for Book 2274.

LINK-BELT P.I.V. VARIABLE SPEED DRIVE



On jute slasher, Link-Belt P.I.V. Variable Speed Drive with electronic control automatically regulates the speed of winding ends onto the beam by control of the moisture content of the material and the accumulating diameter of the wound beam.

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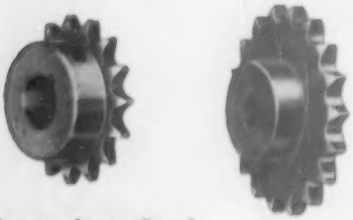
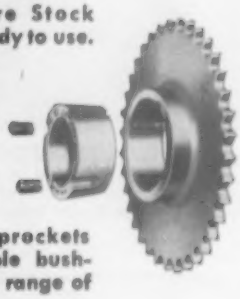


Minimum bore Stock Sprockets for reboring.

Finished bore Stock Sprockets—ready to use.



Taper lock Sprockets with replaceable bushings to fit wide range of bores.

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4. Forms a solution, not an emulsion . . . is stable in any concentration.
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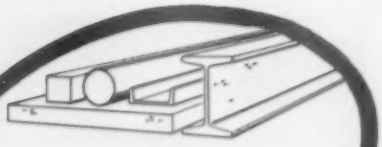

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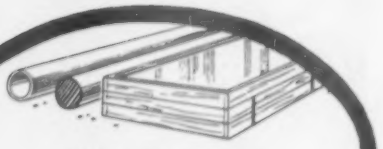

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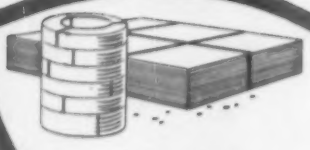

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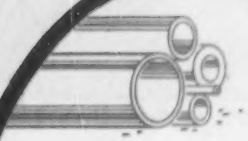

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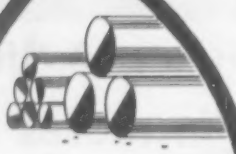

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Looking Ahead in Business

Consumers, the most important yet most unpredictable group in the economy, are just as eager to buy durable goods now as they were last spring.

This attitude has just been reported by the University of Michigan Research Center in one of its periodic surveys of consumer spending. It is good news because it means consumers will not kick off a recession by letting up on purchases of "big-ticket" appliances, autos, and housing. But it also means we'll have to look elsewhere for something to push the business boom higher.

The outlook for specific durables varies. Some of the more significant shape up like this:

- *Automobile production will drop off about a million from the record 8-million units turned out in 1955.* Dealer stocks have been mounting. Should this become chronic, Detroit may offer 1957 models early in an effort to overcome reluctance to buy this year's relatively unchanged designs.
- *Output of electrical appliances will probably increase about 5%.* New models in color may seduce otherwise sales-resistant customers.
- *The boom in radio and TV sales can scarcely maintain itself at the 1955 clip.* Perhaps 6.5-million TV sets is a reasonable goal—still a good year but well below last year's banner records.
- *Housing starts will drop off by 10% and with them possibly the scramble for new furniture to fill empty rooms.* However, by the standards of most years 1956 will be a very good one.

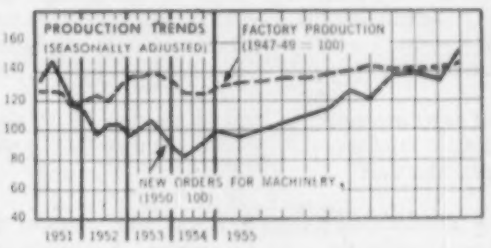
The leveling-off of durable purchases is important because it is in sharp contrast to the immediate past. Last year gross national product leaped up by $33-billion. Consumer purchases accounted for half of it—$18-billion. And almost half of this—$8-billion—was durable purchases.

•

Now that the consumer has decided to ease up on the whip, what is there to push business ahead?

- *Business investment in plant and equipment will be a big item. New installations will cost $33-billion, about 13% above last year.*
- *The government is pushing for new schools, highways, and other public works.*
- *Consumer purchases of food, clothing, and services should still track along with income gains.*

FACTORY'S FIGURES OF THE MONTH



Indicator	Nov.[p] 1955	Oct.[r] 1955	Nov. 1954
New Orders for Machinery (ex. elec.)[1]	150	135	114
Factory Production[2]	146	145	130
Consumers' Prices (cost of living)[1]	115.0[e]	114.9	114.6
Industrial Prices (materials, supplies)[3]	119.3	119.0	114.8
Manufacturing Employment (millions)[3]	17.1	17.0	16.1
Total Employment (millions)[4]	64.8	65.2	61.7
Unemployment (millions)[4]	2.4	2.1	2.9

[p] = preliminary [r] = revised [e] = estimate

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. U.S. Federal Reserve Board (1947-49 = 100); 3. U.S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 4. U.S. Dept. of Commerce, Bureau of the Census.

The Michigan survey came up with some other observations. Most consumers expect to be better off this year than they were last. Events will probably bear out their convictions. Employment should remain high, consumers will get an election-year tax break, and many wage-earners are due for automatic increases under union contracts this spring.

A moderate rise in prices is the greatest worry to the consumer. But it is significant that he is still willing to buy, though rising prices sometimes scare consumers off.

A good bit of last year's buying spree was financed by installment credits, which reached record proportions of over $35-billion by the end of the year. Most consumers do not find it a hardship to meet the payments. For good risks, there is still installment money floating around.

Over-all, the consumer seems willing—and financially able—to do his part to keep business rolling at its present pace well into 1956. But, if the boom is to get another boost upward, it will have to come from somewhere else.

Looking Ahead in Labor

1956 is going to be a tough bargaining year for employers. All signs point to costly demands by labor unions. They will range from the usual wage and fringe benefits to the advancing supplementary unemployment benefit plans and possibly, before the year is out, a strong drive for the shorter workweek.

The signs are evident. You can see them in all segments of the bargaining picture and they look pretty much like this:

• **Economists predict business will continue to boom through the next 12 months.** Labor unions are determined not to underestimate this factor, as they did in 1954 when they averaged a 5¢ boost and decided later that it was too low. Now the demands —and the pressure—will be strong for a greater share in the general prosperity.

• *Wage demands will be spurred by deferred increases coming up during the year to important—and large—groups of workers.* For instance, nearly a million auto workers are due for a minimum 6¢-an-hour boost at mid-year; coal miners get an 80¢-a-day increase in April; construction and trucking industry wages climb from 5¢ to 15¢ an hour.

• *More costly fringe benefits are in sight.* Emphasis will be on insurance covering major or "catastrophic" medical expenses such as the plan granted last year by General Electric Company. There's a similar plan in the aircraft industry to use as a base for this new demand.

• *Supplementary unemployment benefits, pioneered by the United Auto Workers to a point where 100-odd companies tied to the auto industry are included in the program, will be a key issue.* This will be a major demand in the most important negotiations sessions of the year—the steel industry. A breakthrough by the giant steel union on its supplementary drive would include not only the big steel companies, but also the hundreds of steel fabricating firms.

• *Wage contracts tied to the cost-of-living will be revived.* Labor unions dropped this clause in the past two years, but key unions including the auto workers took it up last year and others will follow along. The theory is that living costs will continue to advance slowly. If this works out to periodic increases through the year, it means more wage pressure on employers.

• *The 1956 "sleeper" on the bargaining front is the shorter workweek.* There's been a lot of talk, but no action, on this issue in the past. However, the steelworkers may make this a big issue in June.

•

Watch the development of AFL-CIO's special department of industrial unions for a clue to what you may face from organized labor during the next 12 months. Labeled the Industrial Union Department, this division is composed of some 7-million industrial workers in about 70 AFL and CIO unions.

Led by former-CIO-President Walter Reuther, the department is just taking shape. But, if it's going to work, Reuther's group must concentrate on collective bargaining tactics; there's really no other purpose for its existence. Its stated aim is to "aid and assist affiliates in securing improved wages, hours and working conditions."

If the other unions accept Reuther's leadership, he'll be pushing the supplementary unemployment contracts won from the auto industry. This will mean pressure on the smaller industrial unions to make the same demand. An example of the pressure tactics will be to dissuade unions from accepting an offbeat supplementary unemployment agreement signed by the CIO Glass Workers last year.

The Glass Workers agreed to take the 5¢ supplementary payments as savings to be paid whenever a worker needs the money. It isn't tied to state jobless payments. Reuther forces don't like this and will try to stop it from spreading. There will be counter-pressure from management groups on this issue. The National Association of Manufacturers, for instance, has given this plan the green light and will advise employers to offer this in the face of the regular supplementary demand.

•

Another focal point of Reuther operations may be the big Machinists' union with 450-thousand members in the department. Reuther's United Auto Workers and the Machinists are the two major unions in the aircraft industry. So far, the Machinists have stayed off the supplementary bandwagon—one factor in keeping this contract goal out of the aircraft plants. The industrial department may open the way to framing this joint demand.

SEE LABOR RELATIONS NEWS, PAGE 208

On-The-Job Proof!

LQ600 VALVES

STAND UP WHERE OTHERS FAIL!

In four years of actual field tests, conducted by nearly 100 cooperating companies, NOT ONE LQ600 VALVE HAS EVER LEAKED OR FAILED.

LQ600
150 lb. S.P.
300 lb. W.O.G.

CHEMICAL PLANT

"LQ600 is still tight after three years on a very tough 150 lb. steam service installation where competitive valves used to leak in 2 weeks to 2 months."

MEAT PACKER

"We are writing to let you know how pleased we have been with the LQ600 Valves we put on our toughest lines. We installed these valves in three of the most difficult locations in our plant and have had trouble-free operation ever since they were installed."

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"LQ600 is still tight and functions perfectly after 31 months of service on a water column blowdown installation where competitive valves failed by wire drawing in two months."

DISTILLERY

"An LQ600 Valve was installed for throttling service on a syrup line at 140°F. After 9 months the valve was removed for inspection. It was tight and in perfect condition. This valve was put into another test installation and is still tight."

DAIRY PLANT

"The LQ600 Valve was installed more than three and a half years ago on a steam line with rust and scale present at all times. This valve has withstood service conditions where others were replaced on an average of once a year due to seat and disc erosion."

* Patented Alloy

WRITE FOR Circular 602, a new four-page bulletin on the LQ600 Valve. Request it from your Lunkenheimer Distributor, or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

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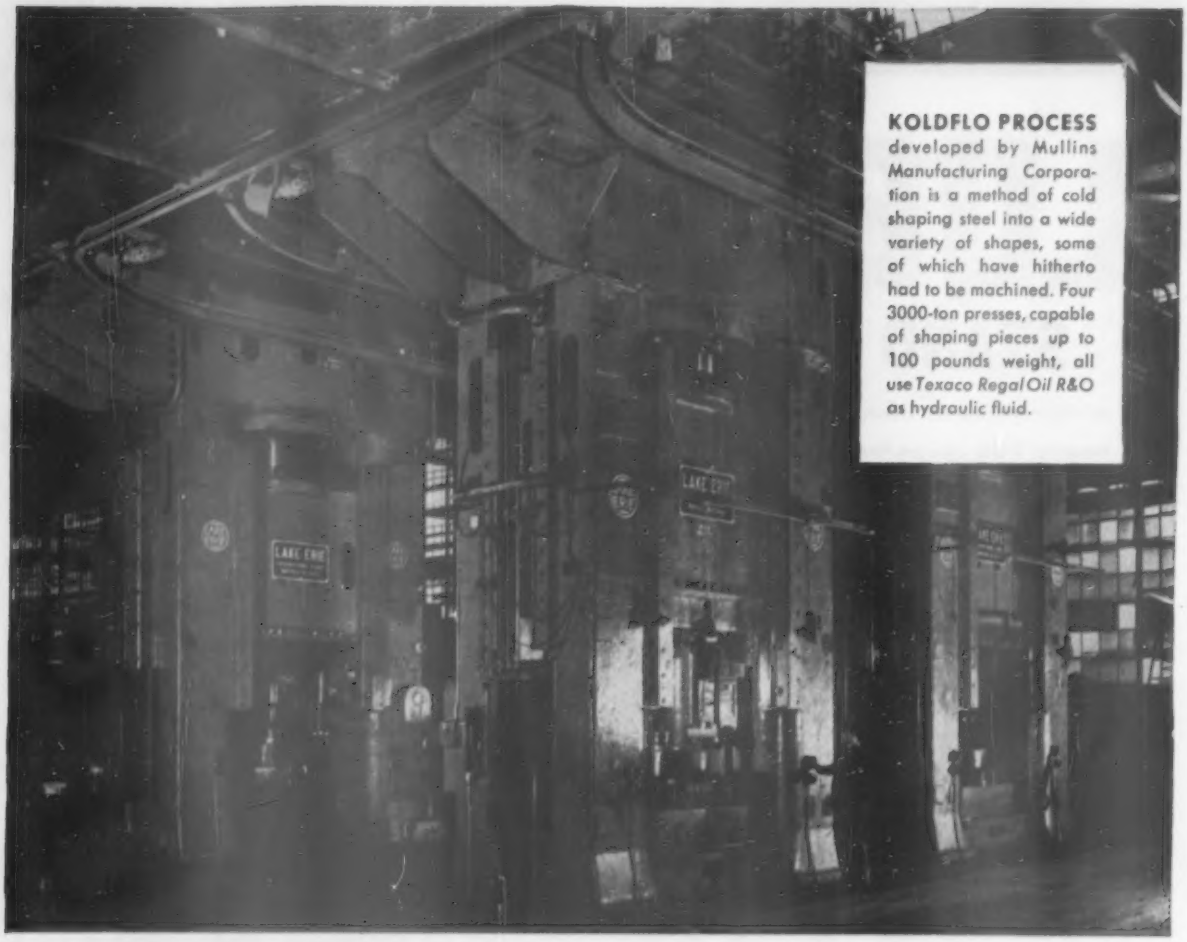


KOLDFLO PROCESS developed by Mullins Manufacturing Corporation is a method of cold shaping steel into a wide variety of shapes, some of which have hitherto had to be machined. Four 3000-ton presses, capable of shaping pieces up to 100 pounds weight, all use *Texaco Regal Oil R&O* as hydraulic fluid.

"Systems completely free of sludge, rust and foam"

—reports Mullins Manufacturing Corporation, Warren, Ohio

FOUR 3000-ton Lake Erie presses went into service in 1953 with an initial fill of *Texaco Regal Oil R&O* – 2700 gallons in each system. Now, two years later, Mullins tells us –

> **"Your Texaco Regal Oil R&O has done a great job in assuring the dependable hydraulic performance we must have. All systems are completely free of sludge, rust and foam. Very little make-up has been required."**

Texaco Regal Oil R&O has been proved by test to have *ten times the oxidation resistance* of ordinary turbine-quality oils – far greater ability to keep systems free from sludge, rust and foam. And there is a complete line of *Texaco Regal Oils R&O* to meet the requirements of all types and sizes of hydraulic equipment, all operating conditions.

Let a Texaco Lubrication Engineer help you select the proper one to keep *your* hydraulics trouble-free. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils R&O

FOR ALL HYDRAULIC UNITS

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

Coming: Bigger Opportunities and Bigger Problems in 1956

GET SET NOW for one of the toughest, most prosperous, most demanding years you've ever faced. From all that FACTORY's editors have been able to discover, that's about the way you can sum up what's ahead for 1956. For every FACTORY reader, no matter where he stands in the plant operating picture, there are plenty of opportunities and plenty of headaches coming up.

Certainly no one can claim we lack the wherewithal to make progress. We've never had more technical and managerial know-how available than we have right now.

The past year has been an exciting one in this respect. For example, there wasn't an issue of FACTORY in 1955 that didn't teem with new ideas, techniques, and equipment in an endless stream. All this wealth of the best and the newest offers the biggest opportunity ever to make 1956 your top year.

But there are problems ahead, too. Since the end of World War II we have steadily been taking advantage of the easier and more obvious ways to improve our operations.

The result is, we're having to dig deeper and work harder to keep on improving. If we don't, competition will get the chance to blister us.

Will You Solve These Problems in 1956?

PRODUCTION, maintenance, human relations—these are the perennial problem areas of any year in manufacturing. But in the year directly ahead there are special aspects of these three problems that call for harder work than ever.

In maintenance, costs are steadily going up, and the big problem is to get preventive maintenance programs under way. Or, if already under way, to improve them and reduce their administrative costs. Work measurement is another hot problem for 1956. Techniques so successful in production are now ready to go to work in maintenance. You'll find plenty of help in past issues of FACTORY. Most important of all, perhaps, is getting a better measure of how successful your maintenance program really is. And now you can do it (see p. 81).

In production, the big challenges are in the field of methods and materials handling. There are no simple, standardized answers here. Solutions in both cases call for the same basic action—*better equipment and more imagination in its use*. But to make better methods and better handling pay off, you also need greatly improved inventory and production control systems. Progress in these areas should be high on your priority lists.

Human relations is the great common denominator of the whole plant operating job. Without well-trained, well - supervised, well - motivated workers and supervisors, all your good equipment and good systems bog down. These are not new problems, but one stands out above all others as demanding more attention and effort this year. We mean supervisory training and development. Do a better job here, and most other problems will fall into line.

Does all this sound too formidable? It shouldn't—because it's only a partial listing of problems you'll face. It's aimed mainly to stimulate you to make up your own list of your own hot problems for 1956—and, we hope, to stimulate you to get moving on their solution. Now.

Problem: Doing As Well As We Know How

WE'VE SAID THIS before, but it bears repeating at this time of year: If only we all made full use of everything that is available to us right now we would automatically be way ahead of where we are today.

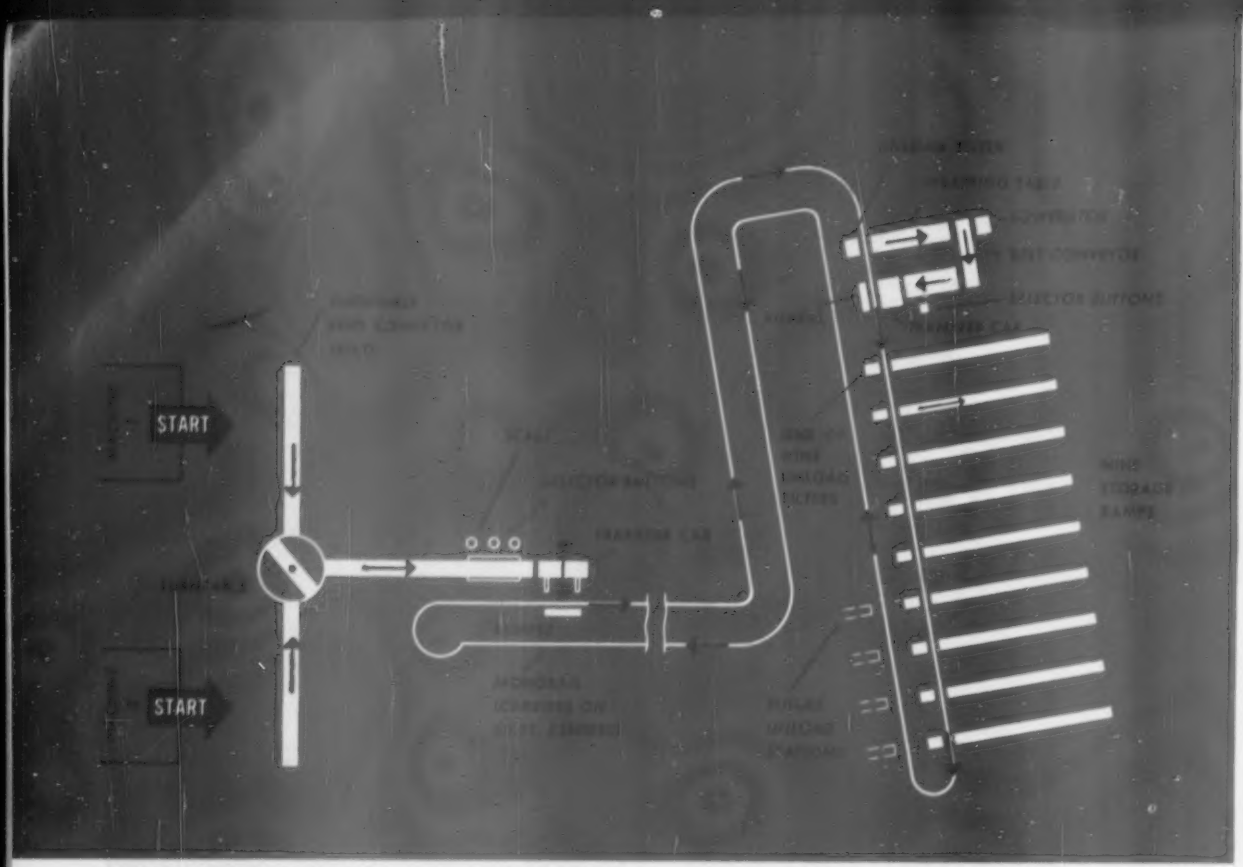
Perhaps the classic example is to be found in the field of materials handling where great progress has already been made. Yet FACTORY editors visit many plants in which such apparently "elementary" additions as lift trucks, simple conveyors, standardized containers, and pallets would make a vast difference.

Why aren't these changes made? Perhaps the principal reason is complacency—a tendency to do nothing until change is forced by economic pressure, usually competition.

What's the solution? It's what we have many times in the past called "constructive dissatisfaction." By which we mean simply that every member of the plant operating team has the obligation to question and criticize every phase of production or maintenance or human relations for which he is responsible. Moreover, he has the obligation to do something about it right now—not at some indefinite future date.

Looking for a New Year's resolution? We suggest this one:

Just make sure you are doing your job as well as it can be done on the basis of what now is available to you. Follow that resolution, and progress will surely follow in 1956.



INTEGRATED CONVEYORS move heavy rolls of paper from machines to warehouse. From machines, belt conveyors carry rolls to turntable. Another belt carries them to scale. Transfer car then loads them on overhead conveyor for rest of trip.

Heavy Handling Goes Automatic

Brand-new conveyor installation moves up to 1000 rolls of paper a day from machines to any of nine spots in warehouse, weighs 'em on the way. One man runs it.

MOVING ROLLS of paper can be one of industry's tougher handling jobs. If, for example, a company turns out 300 tons of paper per day, or say 1000 rolls. If the rolls weigh up to 7000 pounds apiece. If they measure up to 50 inches in diameter, 100 inches in width. If they must be moved 500 feet from winding machines to warehouse.

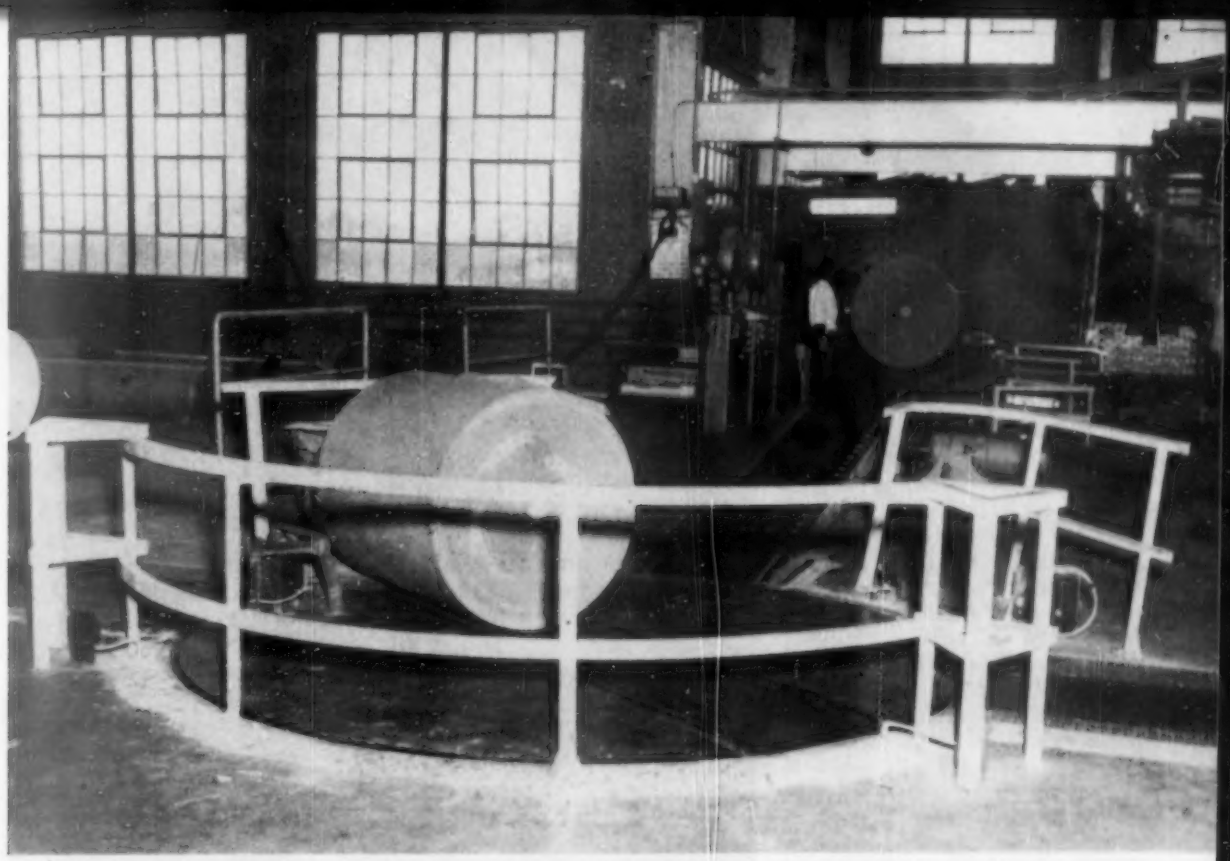
One-man job—You've just been listening to a recital of the handling problem at Camp Manufacturing Company, Franklin, Va.—which sounds plenty tough. Yet, for the past six months, one man has been swinging the whole thing. With the help, that is, of the conveyor system diagramed above.

Without the conveyor it would take three fork trucks working three shifts to do the same job. And most of the time the machine floor would be crowded with finished rolls awaiting transportation.

Future benefit — With a selector switch at his station, the operator can now send a roll to any of nine unloading stations in the warehouse. With six more stations now under construction, the conveyor operator will have enough stations to set aside one for each order being processed. Orders now have to be mixed. And separating them takes two fork trucks and one unloader working around the clock.

The need for this additional handling will be largely eliminated when system is complete. So will the chance for errors in shipments. With a separate station for each order, both conveyor operator (when he sends roll to a given station) and unloader in warehouse (when he reads bill of lading) must make a mistake before an order can be shipped incorrectly.

Old method — Rolls from machines were pushed across floor about 90 feet to an elevator, passing over floor scales on the way. If rolls had to be wrapped (not all do), it was done on the floor between machines and scale. An elevator operator lowered rolls to floor below for distribution by fork truck to cars on a nearby siding, to truck-loading ramps about 300 feet away, or to the warehouse.



TURNTABLE, controlled by electric eyes, receives rolls from from machines are set in floor (left and right foreground). either machine, sends them to scale in background. Conveyors Feed from machines to scale is entirely automatic.

Need for the conveyor system became obvious when management decided that all paper should be delivered to the warehouse, for finishing operations and storage before shipment. This greatly increased the handling load, and since all rolls would now have the same destination, a conveyor system seemed to Camp engineers to be the logical solution. The system was engineered and manufactured by Lamson Corporation (Syracuse, N.Y.) and erected by Camp with the aid of a Lamson erection superintendent.

How conveyor system works

Handling begins at the winders —machines that wind the paper into rolls of desired width and diameter. (You'll be able to follow the flow of materials easily by tracing it on the diagram shown on the facing page.)

When rolls are complete, they are lowered to the floor. Workers then drive plugs into the ends of the cardboard cores, move rolls 20 feet across the floor to the conveyor feeding a turntable.

In photo above, the conveyors set into the floor are the conveyors feeding the turntable. One serves each winder. Both move toward the turntable.

Dispatching—The scale operator (background, photo above) selects a batch of rolls from one conveyor or the other, by turning a lever at his work station. When he turns the lever to "Machine 1," only the conveyor serving the turntable from that machine will operate, and only scale No. 1 (each machine's output is weighed on a separate scale) will operate. The conveyor from machine No. 2 and scale No. 2 are then inoperative.

Let's assume, then, that the operator does select a batch of rolls from machine No. 1. The turntable indexes to receive rolls from conveyor No. 1. The conveyor moves the rolls toward the turntable. The first roll in line moves across the turntable, breaks an electric-eye circuit. That stops the feed conveyor and the turntable conveyor, and indexes the turntable 90 degrees to the scale conveyor. (Photo shows turntable indexing, with conveyor to scale in background.)

An electric eye at the intersection of feed conveyor and turntable prevents the turntable from indexing if a second roll is partially on it. So if the operator wants to put two rolls on the turntable, they must be closely spaced. (They're normally spaced so only one is on the turntable at one time.) As long as an earlier roll isn't blocking the scale (as indicated by an electric eye at the scale), the conveyor from turntable to scale is moving. And when the turntable is lined up, its conveyor, too, is actuated unless the scale is blocked. As the roll moves off the turntable, it breaks another electric-eye circuit that indexes the turntable back to pick up the next roll. As soon as the turntable returns to its original position, the feed conveyor to the turntable is actuated automatically.

Turn the page

Begins on page 68

Weighing—When a roll reaches the scale (see photo at right), the scale operator writes weight on the roll, and on a tally sheet at his work station. He then pushes a button (as in photo) which prints the weight on a tally sheet in the machine, and reactuates the scale conveyor.

Note that no more than one roll can be on the scale at one time, since the electric eye at the scale stops the conveyor feeding the scale once an earlier roll is on the scale. And the conveyor cannot be restarted until the scale operator pushes the button that prints the roll's weight. This also means every roll must be weighed.

To warehouse—After weighing, the roll must be sent to one of the nine unloading stations in the warehouse. You'll recall that when the operator pushed the tally button to record the weight, the conveyor started again. It moves the roll to a transfer car. The transfer car is visible just beyond the roll in the top photo.

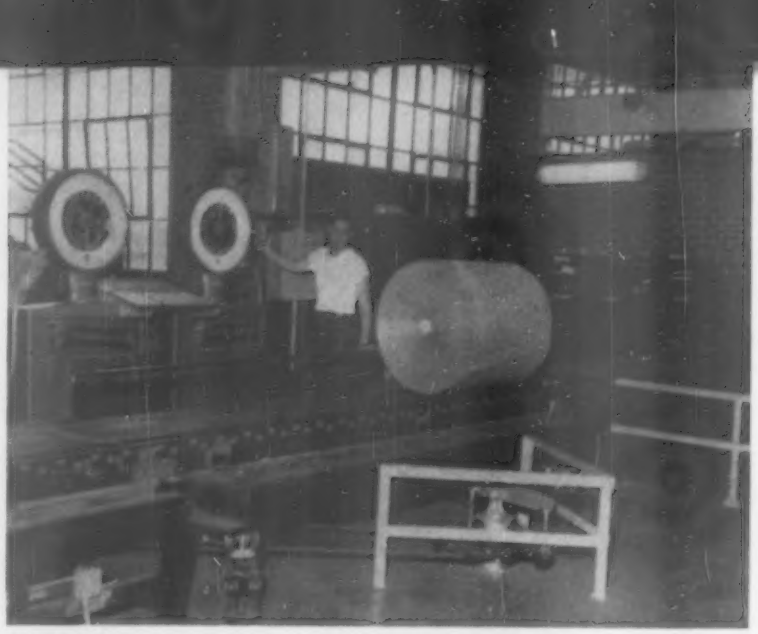
The top surface of the transfer car is a length of belt-driven live-roller conveyor. Thus the roll moves across to the far side of the transfer car. Then the operator pushes a selector button (visible behind operator's arm in top photo) that indicates which unloading station in the warehouse should be the roll's destination.

Pushing the button sets up contacts on the next available carrier on an overhead conveyor (see lower photo), which at this point is parallel to the transfer car. As the carrier moves into place a few feet from the transfer car, the car moves laterally (at right angles to scale conveyor flow) to a position close to path of overhead-conveyor carrier. As carrier passes transfer car, limit switches cause an air cylinder to tip the transfer car, so the roll of paper rolls onto the carrier. An air-actuated bumper snubs the roll, brings it to rest on the carrier without shock or damage to the roll. Then the carrier is off to the warehouse.

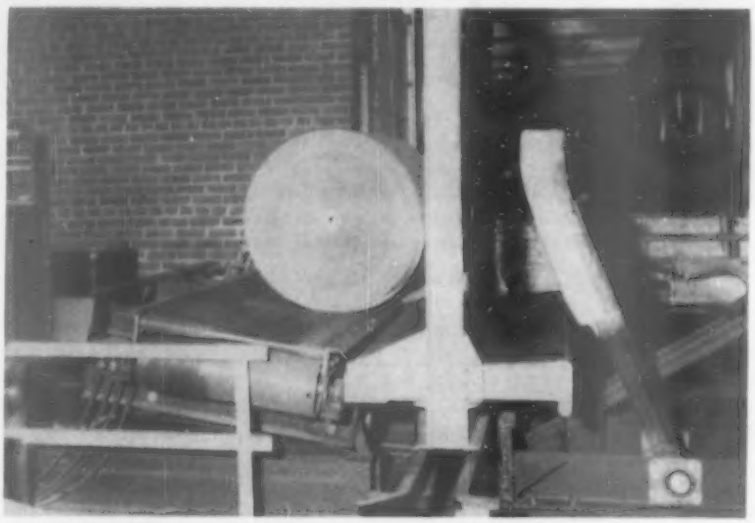
Actually the operator needn't wait until the roll is on the transfer car to push the selector button. In practice the operator usually pushes the button immediately after he has pushed the tally button, releasing the roll. But the transfer car will not unload a roll until its destination has been selected. And a selection is cancelled after each move of the transfer car, so the selector button must be pushed for each transfer. How does the operator know which station to send the roll to? By his tally sheet, supplied by production control. And if he has no printed order, he can check with the warehousemen by means of an intercom system.

Sometimes, when small rolls are being run on the machines, the operator will want to put more than one roll on a carrier. He can do this by throwing the transfer car control to "hand operation." Then the transfer car will not move over to load a carrier until the operator has filled the car with several of the small rolls, puts the system back on "automatic operation." Then, assuming a station has been selected, the transfer car will move over to unload onto the next carrier.

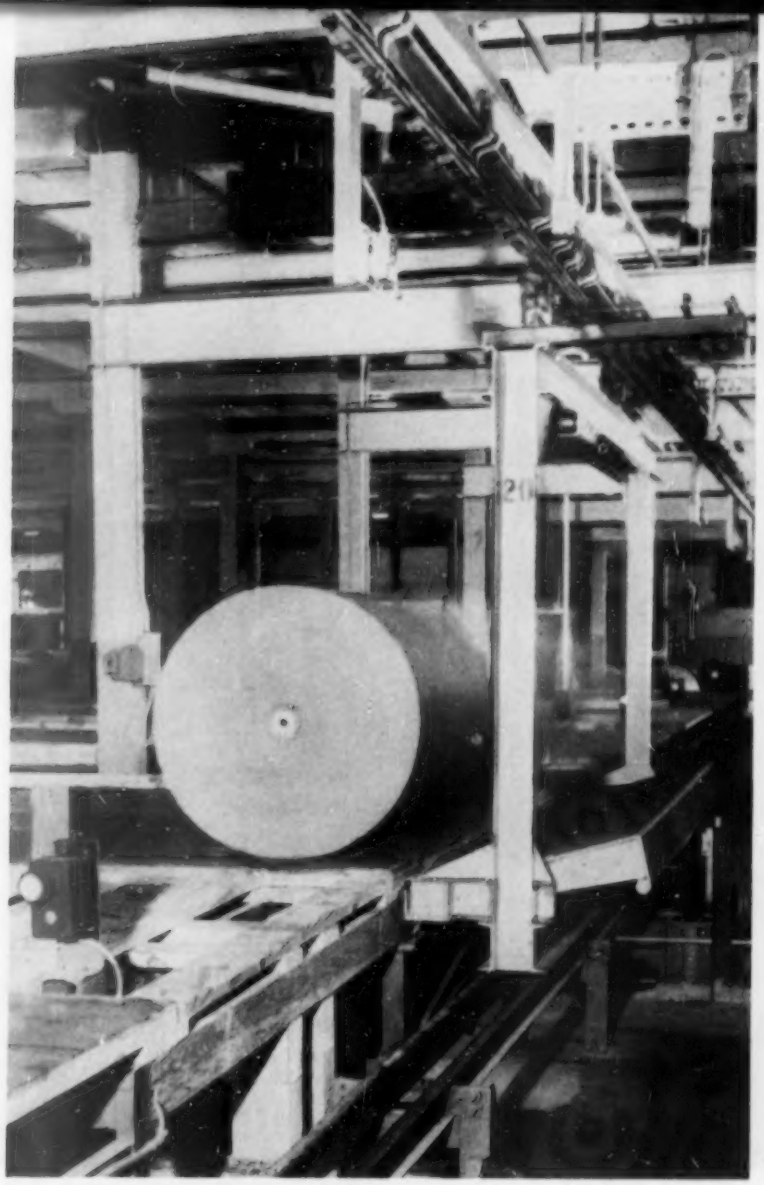
Overhead conveyor—It operates continuously at 30 feet per minute, has carriers at 60-ft. intervals. This gives Camp enough capacity for present needs. Should production increase, more carriers can be added



AT SCALE, rolls stop automatically. Operator is pushing tally button to record weight. He selects roll's destination by pushing button on panel behind him.



TRANSFER CAR has here moved over from scale conveyor, is unloading roll onto carrier of overhead conveyor. Bumper (at right) brings roll to rest on carrier.



AT UNLOADING STATION in warehouse, contact tabs on the carrier brush contacts at the station, actuating an air cylinder that tips the carrier, dumps roll.

or conveyor can be speeded up. Total chain length: 1735 feet. Drive power required: 7½ horsepower. The pick-up from the transfer car is on the second floor of the machine room. From there the carrier travels in a covered tunnel over the roofs of other buildings, then descends to ground level, enters the warehouse (see diagram, page 68).

When the carrier reaches the unloading station previously selected by the scale operator, the contacts set up when the operator pushed the selector button brush other contacts at the station, which actuates an air cylinder under the carrier, tipping the carrier so that the roll of paper rolls off onto the station. (See photo above.)

(Details of tipping mechanism can be seen by a close look under the carrier. The surface actually tipping the carrier is a roller, so that although the carrier is tipped while it is in motion, no undue friction is set up.)

Some of the rolls of paper, as mentioned earlier, must be wrapped. If this is necessary, the scale operator pushes the selector button for station 1, which is the wrapping station. The roll is wrapped, rolled to a short length of belt conveyor, which moves it over a few feet to a reloading station (see diagram). There the roll is pushed back toward the overhead conveyor, on another transfer car.

The operator there has another station-selector panel. He selects the station to which the wrapped roll should be sent (again working from a tally sheet). Immediately ahead of this reloading station, an electric-eye circuit is set up to insure that a wrapped roll is not unloaded onto a car already loaded back at the scale. But as soon as an empty car arrives, the transfer car rolls forward and tips—loading the wrapped roll onto the carrier. The carrier unloads in the standard way when it reaches its destination further along in the warehouse.

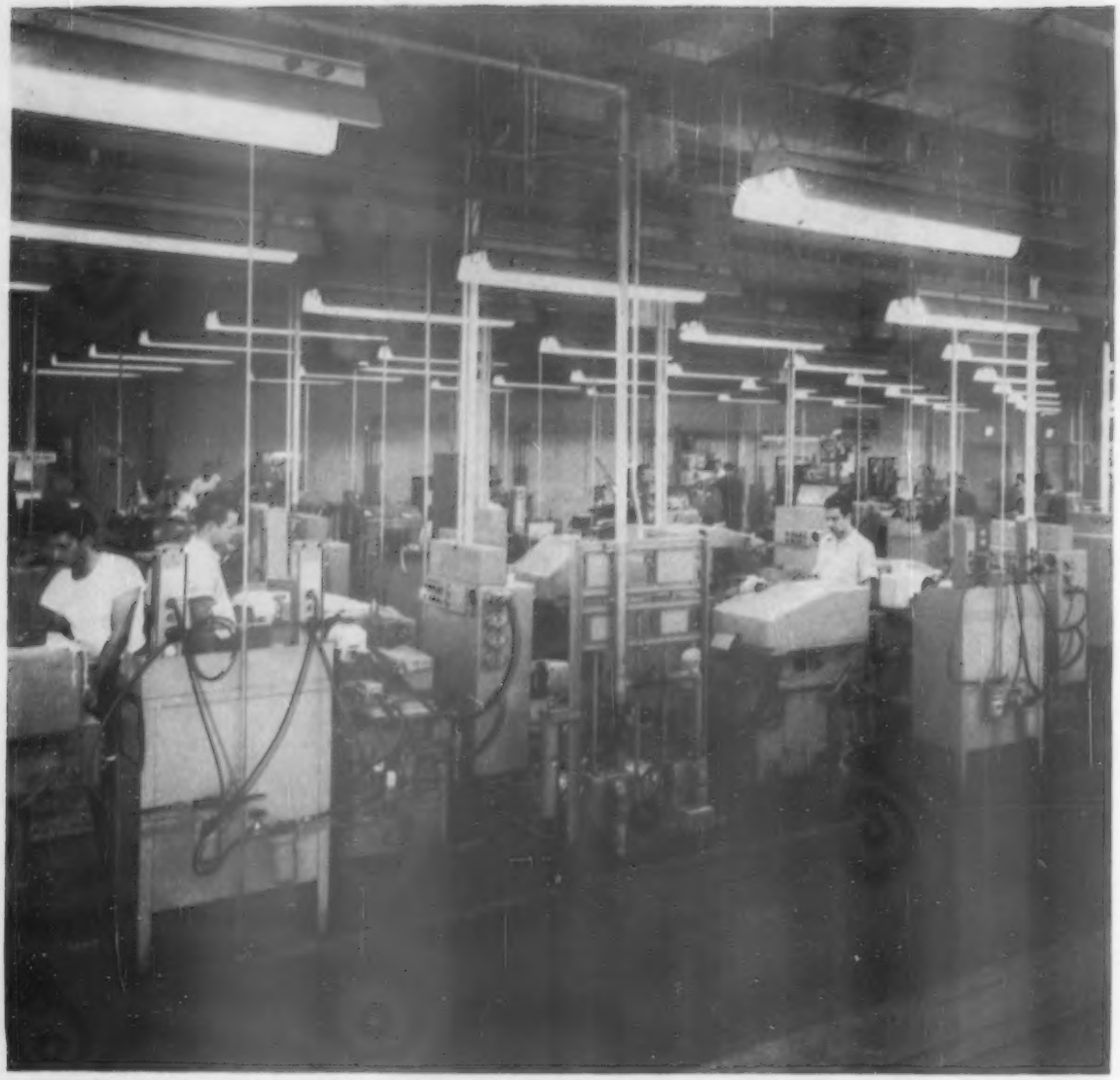
Protective circuits—In addition to the protective circuit mentioned just above, there are several others in the warehouse:

. . . *To prevent damage* caused by any station being overloaded, an electric eye is set up at the end of each unloading station, close to the conveyor (see photo, this page). If the station is fully loaded, the last roll will, of course, break this circuit, which prevents another carrier from unloading here regardless of contact settings.

. . . *If an unloading mechanism fails,* another electric eye is set up that will actuate the unload mechanism at the last emergency loading station in the line, thus preventing any carrier from returning to the scale still loaded.

. . . *As a further precaution,* a limit switch protrudes into the path of the carrier, just past the last unloading station. It is not actuated by an empty carrier, but would strike any roll still on the carrier at this point. Should it be actuated, the conveyor is automatically halted.

Future plans—From any of the nine unloading stations, rolls are carried by fork trucks to finishing machines (for any special operations), to the warehouse for storage, or to trucks or railroad cars. This is not the ideal situation. But future plans call for the installation of more unloading stations, located so that the rolls can be moved directly down ramps from the station to truck or railroad car. Existing stations will then be used only for rolls destined for storage in the warehouse.



CONSISTENT QUALITY from automatic precision machines. That's benefit No. 1 at Marlin-Rockwell. But don't credit it all to the machines. With air conditioning, workers are more efficient, keep the machines running in good tune.

More From Climate Control

Air conditioning for process reasons? Of course. But why stop there? Look what this company is getting from an over-all system that conditions for comfort, too.

WE HAD NO CHOICE. We had to install air conditioning for process reasons. That's the conclusion people jump to when they hear about our new installation. Of course, they say, air conditioning pays off when you're making precision parts—such as ball and roller bearings—with tolerances in millionths of an inch. But that's about all the economic justification you can muster for it.

That was our first view, too. And on this basis alone Marlin-Rockwell specified air conditioning for about half the plant area when it first planned the new Falconer plant in

By E. W. GARRISON, Quality Manager
Marlin-Rockwell Corporation
Jamestown, N.Y.

FEW MISTAKES. When inspectors of high-precision parts work in air-condtioned comfort, their efficiency reduces rejects in final sampling inspection.

1952. Air conditioning was to cover critical assembly areas, final inspection, gage rooms, cleaning and packaging operations. It involved temperature and humidity control and dust removal.

But as plans developed, management had to decide whether to limit air conditioning to critical process areas or include the whole plant. Engineers said the cost of temperature and humidity control in non-critical areas would not be much greater. So management decided for the entire plant.

Time has proved this was a wise move. Because in addition to process advantages, total air conditioning has given us:

. . . Big reduction in rejects caused by human frailties and failures.

. . . High production maintained along with high quality.

. . . No hot-weather shutdowns.

. . . Good worker morale.

. . . Low lost-time accident rate.

. . . Low labor turnover.

Biggest payoff—Of these benefits, reject reduction was the most impressive. And most remunerative. Why? Customer inspection of our "Ultra-Super-Precision" bearings on quantity orders is done by statistical sampling. Rejection of sample lots can return entire shipment to us for 100% re-inspection.

This involves great expense in re-handling—opening packages, removing protective coatings, re-inspecting, represervation, repackaging. We found, with air conditioning, that operators can maintain such high efficiency that we have eliminated complete job rejections.

This means that air conditioning at Marlin-Rockwell has improved operator efficiency as well as machine performance. We explain it this way: Although we have the finest machine tools available—many of them are automated—they require much more control. Overall efficiency, therefore, depends on people—operators, supervisors, set-up men, inspectors. And there are many other machines in non-critical areas where quality is controlled solely by operators. Here, too, we see how good climate promotes worker efficiency, product quality.

Worth the cost—The cost of the Falconer air conditioning system (other than for process cooling) is 3¢ per bearing manufactured—on an annual basis. With higher volume this cost is gradually going down.

But even at the 3¢ figure, we believe air conditioning is well worth while when we balance our benefits against cost. For example, during the very hot spells in the summers of 1954 and 1955, many other factories in our area had to close down early. But our Falconer plant kept right on operating 24 hours a day. No letdown in quality, either.

Then look at our improved safety record. We know the use of color dynamics in painting walls, machines, gages, and equipment has helped achieve a better record. Good housekeeping also helps. But much—if not most—of the improvement, we believe, comes from air conditioning. The severity rate of the Falconer plant is by far the lowest of all our plants. We enjoy a rate of 0.18 day per 1000 man-hours in comparison to 0.98 in one of our plants without air conditioning.

To sum up, what is Marlin-Rockwell's attitude on plant air conditioning today?

Put it this way: Whenever the need comes to expand, we certainly expect to add complete air conditioning as an essential ingredient. No doubt about it.

EVERYBODY MOVES up front when each department shoulders its share in safety. B-47 final assembly group was first to work a million safe man-hours. As others followed, Lockheed's safety record far exceiled aircraft industry's mark.

12 Steps to a Safety Award

Your plant, too, can be a winner — same as this one. Here's how Lockheed keeps all 16,000 workers hopped up about safety, snares one award after another.

"A NEAR-PERFECT example of a top-to-bottom safety operation." That's how an insurance executive described Lockheed Aircraft Corporation's plant at Marietta, Ga., as he awarded employees there the third citation in a row. F. W. Braun, vice president for accident prevention of Employers Mutuals of Wausau, cites Lockheed's latest record to show that a sound safety program just naturally pays off in fewer accidents. Figures released for 1954 show the plant held lost-time accidents to 22 for 16,000 employees working over 31-million man-hours. That's a frequency rate of 0.71 mishaps for each million hours worked. Aircraft-industry average is 2.82.

Other recent Lockheed kudos:

. . . *Award of honor* from National Safety Council in 1953.

. . . *Same award* for working 4,204,886 consecutive man-hours without a disabling injury in 1954.

. . . *Million man-hours award* for 1955 from the Associated Industries of Georgia. Lockheed's Georgia division worked 3,773,480 man-hours without accident from February 9 through March 17, 1955.

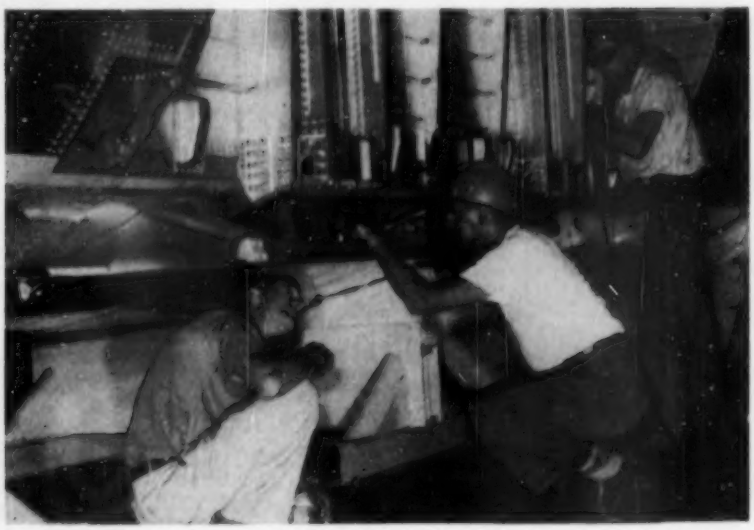
The photos on these and the next two pages tell how Lockheed did it. Lockheed bases its program on five essentials — management interest, good organization, authority vested in the safety department, dramatization of the importance of safety, and corrective measures.

1 **AUTHORITY** to enforce rules. General Manager D. J. Haughton tells Safety Manager Frank Knight. "You've got one job. Don't let anybody get hurt. We'll back you 100%."

2 **TOP MANAGEMENT INTEREST** is a bulwark. Executives work with general safety committee on special problems, hazards. Fletcher Brown, manufacturing manager, presides.

3 **EMPLOYEE PARTICIPATION** is welcome. Working committees (81 of them) like this one solve over two-thirds of safety problems. General committee awards monthly "white elephant' to supervisor with poorest record, trophies to the best two.

4 **SAFETY EQUIPMENT** (like gate on shear) helps safety. Money spent shows company commitment to safety.



5 **SAFETY REGULATIONS** in each department are tailor-made to fit every job. Goggles, hard hats, safety shoes, and other personal and machine equipment are must's for all workers on Lockheed's assembly lines.

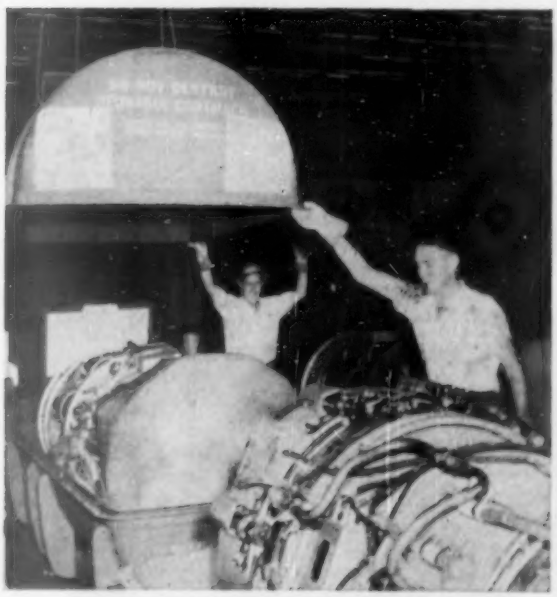
6 **REGULAR INSPECTION** by Safety Engineer Stanley F. Reid uncovers diffcult —sometimes hazardous—working conditions inside B-47 bomb bay. Reid will prescribe gloves to prevent knuckle nicks, plus portable spotlights.

9 **FIRST AID FAST** is provided at this first-aid station. All accidents, however trifling, are treated and recorded by professional personnel at four first-aid stations and at the main medical center.

10 **SUPER-CAUTION** guards against subtle dangers. Workers wear respirators while brushing on solvents. No need to worry about fumes.

7 **PROGRESS REPORTS,** like chart of eye injuries, reveal safety score. Employees need to know safety facts and figures before they're sold on safety's significance.

8 **COMMON SENSE WORK CLOTHES** are encouraged. Operator shown above wears no bracelets, no loose clothing, no long hair. But she's still neat and attractive looking.



11 **INGENUITY** plays a big role in Lockheed's program. Whistles in workers' mouths give crane operator shrill warning at first sign of slipping or other danger.

12 **SAFETY BEYOND THE PLANT** is billboard reminder to take safety home. Management reaches out, too—recently corrected a highway hazard several miles from plant.

Six New Jobs for Your Camera

For lots of plant jobs—some you'd never guess—pictures work better than a thousand words. Here's how they save time, dollars, and lives for Ryan Aero.

PICTURES do a job that nothing else can quite equal. So says Ryan Aeronautical Company, San Diego. Ryan uses pictures in all the obvious ways — employee newspaper, company magazine, sales brochures, reports, employee identification. But it finds photos work best in plenty of other — more original — ways. Here, in text and pictures on these two pages and the one following, are examples of unusual photo uses. They're good ideas for any plant.

1 Visual training

Grouped photos are used in tool familiarization classes. It would cost too much (in damage and breakdown) to let untrained workers learn from actual tools. Ryan substitutes photos. Workers trained this way have cut down accidents, breakage. Ryan also uses photo-reproductions to explain principles and workings of machines.

2 Damaged shipments

Ryan calls a cameraman as soon as a damaged shipment is found. Shipment is returned immediately, with copies of a written report and photos showing condition on arrival. Almost every time, photos bring agreement on cause of damage—rough handling, poor packaging, inadequate bracing, etc. Employees in receiving department have strict orders: "Don't touch until pictures have been taken."

3 Template layouts

In material stores, a camera saves hundreds of dollars daily. Layout section in stores consists of a large table (with horizontal and vertical grids) and a polaroid camera hung from an arm above. Paper templates corresponding to metal parts are shuffled into nesting design until largest number of parts per sheet is found. Then camera clicks. A minute later, pattern is ready for router operator to follow in cutting metal parts with metal templates.

4 Template reproduction

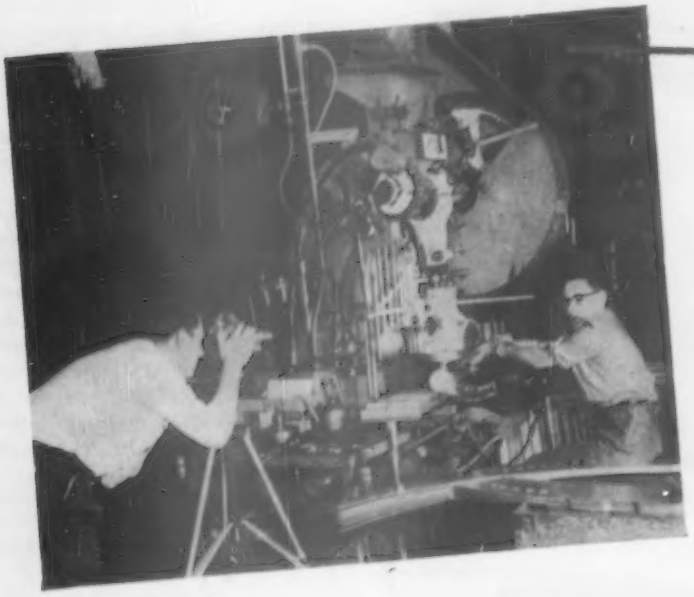
Another innovation is the huge 8½-ton Langston monotype camera. Engineering reproduction uses it to turn out photographic copies of original drawings for posters, templates, illustration, charts. It can reduce or enlarge from fractions of an inch to 5x10 feet. Camera costs about $50,000 new. Ryan acquired this one from Navy surplus nine years ago for some $17,000.

Primary use of the camera is in reproducing templates. Ryan's experts have evolved a tricky system—called "Flop Master"—of reproducing both sides of a symmetrical design from half a drawing. It requires precise alignment of a reversed negative. Cuts drawing time 50%.

In another job, the room-size camera transfers engineering drawings directly to the material from which experimental parts are to be made. This requires a Ryan-developed sub-stratum solution that

permits sensitized emulsion to adhere to all kinds of materials—aluminum, steel, wood, masonite, plastic, micarta, vinylite. The solution overcomes the difficulty (encountered when parts are stretched or bent in forming) of maintaining an undistorted photographic pattern. The technique eliminates several steps formerly required in fabricating prototype parts. Scribing on steel sheets (they had to be cut, filed, and drilled into templates) and application of templates to material are now replaced by photo reproductions of layouts on the material.

Other jobs for the monotype camera: Scale projections for die-making are enlarged to just the right oversize to compensate for cast metal shrinkage. Scale reproductions of drawings for wind-tunnel test models are easily made. Engineering drawings are reduced to any desired scale, saving lots of blueprint paper. And corrections on later drafts of engineering drawings are a simple matter when applied to "vellum second originals," turned out by engineering "shutter-bugs."



5 Safety in the shop

Movies made for the safety and welfare department are an informal but important part of Ryan's motion picture operations. Chief Safety Engineer Herb Rawlings and Jim Newman, motion picture photographer, turn out 5-min. dramas (in color) that reproduce accidents in the plant, usually starring the real victim in how-it-happened and how-to-prevent-it sequences. They also film potential-accident situations. Safety supervisor shows these films at regular monthly departmental safety meetings, makes pertinent comments.

Workers and supervisors are enthusiastic about the wallop these films pack. Ryan's exceptional record—as of last June 16, 250 days and over 5-million man-hours without a disabling injury—testifies to the effectiveness of this and other features of the safety program.

6 Job description

William Rossi, interviewer, hit on an ingenious way of using photos to screen job applicants. His problem: processing 100 applicants a day for 605 job classifications. Sometimes, on technical matters, he found his meaning and the applicant's interpretation miles apart.

Rossi now uses photos to illustrate job descriptions, thus speeds interviews, makes everything clear. With his indexed looseleaf folder of 8x10-in. photos, he can point out, instantly and graphically, job requirements that used to take half an hour to describe.

Now You Can Really Measure Maintenance Performance

No more guesswork now. Not with this brand-new Du Pont yardstick. It will tell you how good—or bad—your maintenance performance is, help you set new goals, measure your progress. And it will work in any plant—big or not so big.

MORE AND MORE plant management is asking the maintenance executive this important question: "What is the performance of your maintenance department?" Then comes the crusher: "How do you know?"

The answers have been as varied as the many types of yardsticks the maintenance executive uses to measure performance. Foremost among them is percentage ratio of maintenance cost to cost of product or to plant investment, or units of products made per maintenance dollar.

By W. S. LUCK, Maintenance Consultant, Engineering Department, E. I. du Pont de Nemours & Company, Wilmington.

Such yardsticks haven't been too successful because *no one or two of them determine the actual performance of a maintenance unit.* As a rule they show only trends of limited significance, denoting progress or lack of progress in one area. They give no clues as to what program to set up for improvement.

What is needed by the maintenance executive is a means of diagnosing the health of his organization by some periodic evaluation that reveals the weak points and flaws. Then he can prescribe a program for improvement. He can justify the cost for more or better tools. He might even show how higher maintenance costs will reduce unit costs of product through less downtime and improved quality of product. *We at Du Pont have developed, tested, and proved a method of diagnosis that answers these needs for us.*

As in many other industries, the battle against mounting costs is a continuing one at Du Pont. Our processes are becoming more and more complex as higher temperatures, greater pressures, and closer tolerances are required. Because of more complex process equipment and vastly increasing use of automatic controls, maintenance costs are becoming a larger ingredient of the cost of manufacture (we call it "mill cost"). Management is in an enviable position if it can cut both maintenance and mill costs. It is still in a good position if, despite more complex operations leading to higher maintenance costs, it can reduce the mill cost and at the same time improve product quality.

All of which says, in effect, that maintenance costs by themselves are not too significant. Therefore any method for evaluating maintenance performance must also indicate its effect on mill costs.

In our company there are plants with many different processes. These include metal-working plants, simple batch-type chemical processes, textile plants, and the most complex continuous chemical process. Therefore it was necessary to develop a measurement technique that would apply to all these operations.

This technique uses a method of graphical evaluation that is relatively easy to understand and apply when you consider the growing complexity of the maintenance function.

Study of the many variables of

How This New Yardstick Has Helped Du Pont

Du Pont has graphically measured maintenance units ranging from 30 to 800 men. Here are three case histories in improvement:

- **PLANT 1**—In 1½ years, reduced annual maintenance costs about $350,000; mill costs correspondingly. Savings resulted from cutting production downtime (for maintenance) from 9% to below 1%. Plant boosted preventive maintenance from under 5% to 55%, cut emergency work from 10% to below 2%, thus lifted labor effectiveness from 35% to 65%. Over-all maintenance performance up 180%!

- **PLANT 2**—Had to increase maintenance costs to obtain realistic work backlogs—and provide better job planning, forecasting, and scheduling and less emergency work. These steps cut downtime, gave more continuity to operations. Results: increased output, better-quality product—both reflected in lower mill costs.

- **PLANT 3**—Already was doing such a good job that it had above-average maintenance performance. But graphic analysis showed ways for further improvement. Result: Plant continues to improve maintenance performance, gets lower maintenance and mill costs.

BASIC DATA SUMMARY SHEET

	FACTORS	PRESENT SURVEY	FUTURE GOAL
PLANNING	Labor effectiveness	65.0%	80.0%
	Percentage of total man-hours of maintenance on work planned and forecast weekly	50.0%	85.0%
	Percentage of total man-hours for emergency work per month	15.0%	4.0%
	Percentage of total man-hours for overtime worked per month	8.0%	2.0%
WORK LOAD	Crew weeks of current backlog	5.0 weeks	3.0 weeks
	Crew weeks of total backlog	8.5	5.
	Percentage of total man-hours per month for preventive maintenance	10.0%	25.0%
	Percentage of total man-hours per month for daily maintenance work	90.0%	75.0%
COST	Maintenance cost as a percentage of plant investment	10.5%	6.0%
	Per cent increase or decrease in maintenance cost per unit of product produced over a base period	+15.0%	−10.0%
	Percentage of total maintenance dollar cost for direct and general maintenance	65.0%	85.0%
	Percentage of total maintenance dollar cost for indirect maintenance	35.0%	15.0%
PRODUCTIVITY	Maintenance activity as expressed by percentage of manpower productively engaged	55.0%	75.0%
	Percentage of forecasting effectiveness	40.0%	75.0%
	Percentage of operating time lost in mechanical downtime for maintenance reasons	12.0%	3.0%
	Per cent increase or decrease in number of units of product produced per maintenance dollar over a base period	+17.0%	+12.0%

FIG. 1

NOW AND FUTURE—Du Pont uses data like hypothetical figures in left column to plot today's maintenance performance, find weak spots. Then sets new goals (right).

our complex operations that affect over-all maintenance performance has shown that four basic functions are common: (1) planning, (2) work load, (3) cost, (4) productivity.

Planning—Includes those activities that control the work-planning aspect of the maintenance unit. It indicates how well the unit is handling its administrative functions.

Work load—Includes those activities governing the work load of the maintenance unit and methods of execution. It indicates how well the unit is controlling its backlog and handling the work required by production and other departments.

Cost—Includes those activities that reveal cost trends, methods of cost distribution, and plant investments. It indicates how much it is costing the maintenance unit to handle its planning, control the work load, and provide the necessary services to the plant.

Productivity—Includes those activities that relate to measurement of productivity. It indicates what the plant and maintenance unit get from the money spent to control various phases of maintenance work.

We have found that if we can appraise our maintenance status in the light of these four basic functions, we are well on the way toward pinpointing the causes of many of our difficulties. But further study has shown that the status of each of these functions is in turn dependent on many other lesser factors or activities. And that the status of those activities can be determined by *statistical information* usually available or obtainable. For example, a high overtime ratio or a high rate of emergency work usually indicates a need for better planning. Or a low percentage of preventive maintenance or a high rate of daily maintenance work may show a need for redistribution of manpower.

In our graphic method we have selected four subordinate factors that make up each of the major functions. Why four? Because they provide a finite measure of performance and lend themselves to graphic treatment. And because we wanted to keep our method as simple as possible. There are many more subordinate factors we might have used. And they vary according to process, organization, and type of operation. But we narrowed them down to four for each major function. The following 16 factors (4 in each function) could apply to a conventional chemical operation:

1. PLANNING

Labor effectiveness—This factor represents the degree of skill or effort exerted by mechanics when they are observed working. Data can be obtained from time studies recently made in the area. Or through work sampling.

Percentage of total man-hours of maintenance work planned and forecast weekly—This factor measures ability of the maintenance organization to forecast its work (jobs, not manpower) at least one week ahead. To get this information we analyze our weekly forecasting sheets over several months to see how much work was forecast.

Percentage of total man-hours for emergency work per month—Emergency work is defined as anything that breaks our daily schedule (for jobs and manpower). The amount of emergency work is normally dependent on the ability to plan work, hence indicates the effectiveness of daily scheduling. This percentage is determined by dividing man-hours of emergency work by total man-hours of work in the period analyzed.

Percentage of total man-hours for overtime worked per month—This factor also reflects ability to plan and schedule work. It involves all overtime work, including emer-

gencies. This percentage is determined by dividing reported overtime hours by total man-hours worked in that period.

2. WORK LOAD

Crew weeks of current backlog—This includes total amount of approved work to be done (expressed in crew weeks) that has been planned and scheduled, and for which no impediment exists for not having it done. This means that necessary materials, tools, and manpower are available, and that equipment can be shut down.

Crew weeks of total backlog—Represents total amount of approved work ahead at any selected time (usually at month endings). It includes the current backlog and all other work that is approved but cannot be worked on because of lack of materials, tools, or manpower, or because of no agreement as yet from production units to shut down equipment.

Percentage of total man-hours per month for preventive maintenance—Preventive maintenance includes such items as lubrication, scheduled inspections, scheduled overhauls, hydrostatic tests, safety valve inspections, and so on. The percentage is related to total maintenance man-hours for that period.

4. Percentage of total man-hours per month for daily maintenance work—Such work is done by request. In short, any and all work not on preventive maintenance. It includes routine daily repairs and overhauls that are usually non-repetitive. Again, percentage is stated as part of total maintenance man-hours for that period.

3. COST

Maintenance cost as a percentage of plant investment—This cost (in dollars) includes labor, material, and overhead, also purchased replacements. Plant investment is for buildings, and production equipment, and facilities, but excluding real estate. Book or replacement value can be used. The percentage is derived for any period—a year, or more, or less—as circumstances dictate. Many plants already use this figure as a basis for checking performance.

Per cent decrease or increase in maintenance cost per unit of product produced over a base period—This shows trend—status quo or up or down. Maintenance cost is maintenance dollars required to produce a unit of product. The base period selected is usually the preceding 2 to 5 years, depending on the records available. The maintenance cost must be adjusted by an index (see FACTORY's Cost Index, page 132) to the base period for changes in labor and material prices.

Percentage of total maintenance dollar cost for direct and general maintenance—Direct maintenance covers the maintenance of operating or productive equipment. General maintenance covers buildings, floors, and similar facilities.

Percentage of total maintenance dollar cost for indirect maintenance—This covers experimental or development work. It includes replacement, or additions where the design of a component has been changed or a new material has replaced an existing material. It also covers the so-called convenience items that may or may not affect production of the plant.

4. PRODUCTIVITY

Ratio delay (maintenance activity as expressed by per cent manpower productively engaged)—No attempt here to measure skill. It indicates percentage of wage-roll personnel working at a given period of time. Usually determined on a work-sampling basis where sufficient observations are made of personnel in their normal day's assignment. From these data, percentage productively engaged can be computed.

Percentage of forecasting effectiveness—This shows effectiveness of planning and forecasting. In the second item of "Planning" we determined percentage of man-hours per week planned and forecast. This factor, however, determines ability to perform in accordance with that forecast. We survey weekly forecast sheets for at least two months. Actual accomplishments (in man-hours) are expressed as percentage of forecast.

Percentage of plant operating time lost in mechanical downtime for maintenance reasons—This indicates quality of maintenance work. Normally only equipment is involved. This figure is usually the key in establishing of a corrective maintenance program. Usually the information can be developed from records. But sometimes it is necessary to study downtime on specific operations by work sampling.

Per cent increase or decrease in number of units of product produced per maintenance dollar over a base period—This is the reciprocal of the second item under "Cost." Same base period should be used. Here again, cost must be adjusted by an index to get a fair comparison. Should plant or operation involve more than one product, multiple products are weighted, or an equivalent to the major product is applied to each one.

Any company, in any type of operation, that is practicing the fundamentals of good maintenance organization and procedures, should be able to develop numerical values for these 16 subordinate factors. But at this point let's make it clear that these same 16 factors may not necessarily apply to all plants.

For example, overtime is sometimes not a factor. Then we select another. Selection of the factor under each of the four major functions will vary from plant to plant according to process and operating conditions. In a machining plant, for example, factors of scrap, rejects, and machining rate might be more important than mechanical downtime. Good factor selecting also requires a study of maintenance organization and its paperwork, methods, procedures.

Whatever factors you do use must have a definite relationship to one another, and interact so that any change in one factor will have a direct bearing on the others. And they must be able to be expressed numerically on a scale.

Moreover, the selection of workable factors requires good judgment based on wide experience and sound knowledge of the maintenance function. To make the kind of survey for determining over-all performance calls for a qualified maintenance engineer well grounded in the basic principles of good maintenance. No one else can properly set up the survey or interpret the resultant graphic data. It's too easy for the inexperienced to draw wrong conclusions from reliable data.

To learn how to use these four functions, turn the page

FIG. 2

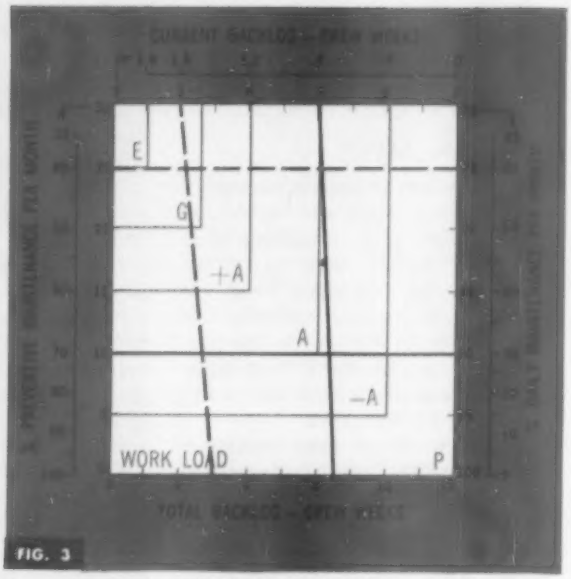


FIG. 3

BIT-BY-BIT PICTURE—Each of four graphs plots basic data (Fig. 1, p. 82) on one major maintenance function and its four factors. Intersection of solid lines falls into one of six evaluation areas, thus rates performance, spots weaknesses. Then

How the Four Major Functions Are Used to Rate

How can these four functions and 16 factors appraise maintenance performance? Assume we've developed statistics for each factor (Figure 1). This is our basic data summary. Values are hypothetical but realistic enough for a conventional chemical plant. Such data are developed mainly from records. Where records are not at hand, work sampling may be necessary.

These data are interesting. But they don't mean much because they don't tell whether the situation is good or bad—or what to do. We need to correlate them to show over-all performance.

Our graphic method does just that. We use four graphs (Figures 2, 3, 4, and 5), plus a fifth (Figure 6). Figure 6 correlates composite data of all 16 subordinate factors in Figures 2, 3, 4, and 5 for *planning, work load, cost, productivity.*

Here's how we use the graphs: In each one the numerical value (or performance value in Figure 6) of each of the four factors in turn is pinpointed on one of four carefully chosen scales around the four sides of the graph. The pinpoints on each pair of opposite sides are joined by a straight line. This gives two straight lines—one top to bottom, the other side to side. Intersection of the lines denotes performance evaluation of the four factors as a whole for the major function.

There are six intersection areas in each graph. They rate performance as follows: *E*, excellent; *G*, good; *+A*, above average; *A*, average; *–A*, below average; *P*, poor. All five graphs differ in the area boundaries. This is because factors and scales vary.

Selecting scales—The same scales don't always apply to the same factor in all plants. Ranges must be developed (as are factors) from experience, judgment, type of process, and operating conditions. Groundwork for selecting scales is laid during development and analysis of basic data. At that time we can determine plant condition and achieve reasonable correlation with actual performance. Validity of scales and factors can be checked statistically to confirm that information plotted gives a true evaluation of performance in each function.

For proper selection of factors, scales, and performance areas, look at Figure 2. A conventional chemical plant with over 80% labor effectiveness, over 80% of man-hours per week forecast, less than 2% of monthly man-hours on emergency work, and less than 2% of monthly man-hours on overtime would be doing excellent (*E*) planning. But with labor effectiveness of 40 to 60%, forecasting of 40 to 60%, emergency work and overtime 8 to 12% each, planning would be only average (*A*).

Plotting data — With factors, scales, and performance evaluations selected and checked, plotting data from the basic summary data sheet is simple (solid lines in Figures 2, 3, 4, and 5). Intersections show these evaluations for the conventional chemical plant chosen as an example: *planning*, low *A; work load*, high *A; cost*, high *A; productivity*, low *A*.

The big picture — Now transfer these evaluations to Figure 6. Here plotted values are graded from *E* (excellent) to *P* (poor) to parallel performance evaluations of the four major functions. Over-all performance is shown by the area in which the two lines intersect. But a numerical value to measure even small progress is important. So a diagonal is drawn from upper left to lower right and a line perpendicular to the diagonal is drawn from the intersection. The diagonal scales over-all performance from 100 to 0. In Figure 6, the score is 28—which in this case is below-average.

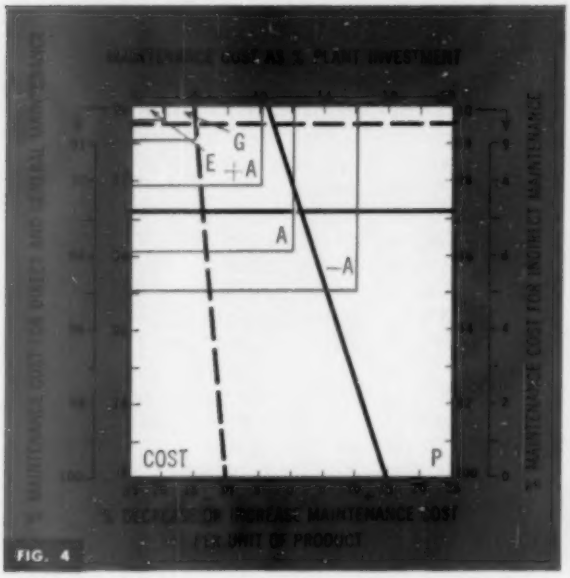


FIG. 4

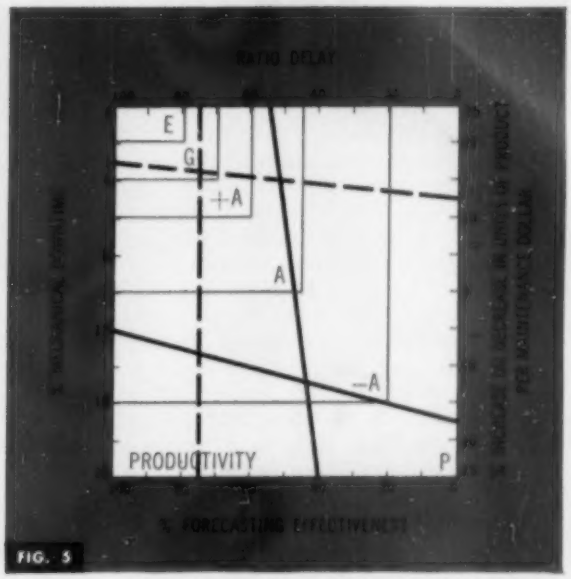


FIG. 5

actual performance in each major function is plotted (Fig. 6, below) to show over-all performance. After analysis of graphs above, new goals (dotted lines) for each factor are plotted. Finally, these goals are combined (Fig. 6) to show over-all goal.

Maintenance Performance

Begins on page 81

Analyzing and interpreting—Now we know how *good* or *bad* maintenance performance is. Next question: *How can we improve the score?* Here more know-how is needed to analyze graphs, uncover weak spots, prescribe steps for improvement.

Study of Figure 6 indicates that limited effort in *planning* and in administration and control of the *work load* has caused below-average performance in *productivity* and *cost*. This again emphasizes that *cost* is the resultant of many closely related factors that must be considered in evaluating over-all performance.

A deeper study is now needed of all factors in Figures 2, 3, 4, and 5 to disclose clues for attack. These clues are described below.

Planning (Figure 2)—Reveals high emergency work (15%) and poor planning and forecasting. Better planning and forecasting will give better work control, reduce emergency and overtime work. And because better planning involves standardization in methods, tools, materials, and labor estimates, it leads to higher labor effectiveness.

Work load (Figure 3)—Shows too much current and total backlog. Also lack of strong preventive maintenance. Study will probably show the maintenance crew is too small,

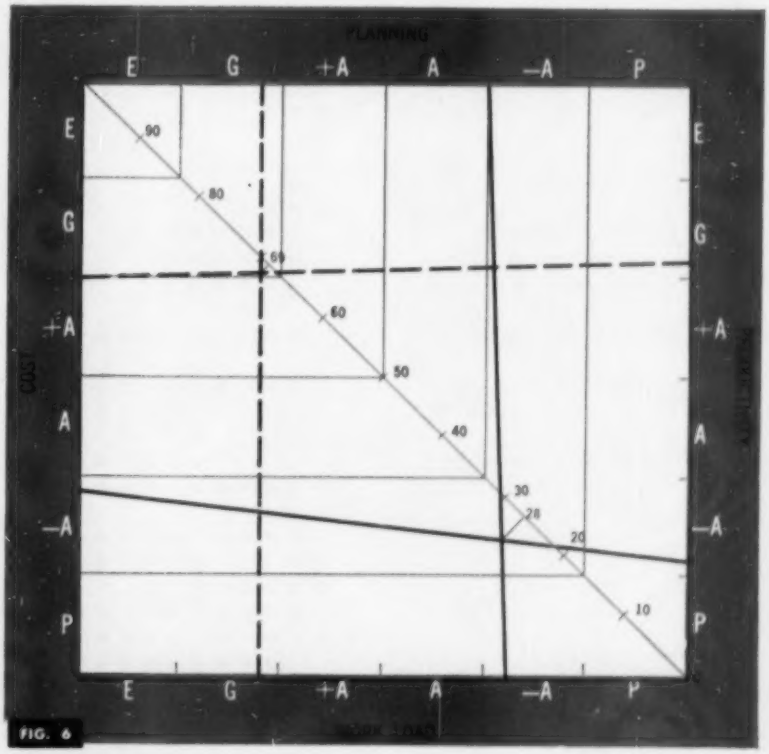


FIG. 6

BIG PICTURE—This graph, with ratings in major functions plotted, gives a composite numerical score for over-all maintenance, helps set new performance goals.

and therefore the penalty of deferred maintenance is cropping out. High rate of emergencies (Figure 2) supports this conclusion. Common tendency here might be to knock off people. But the graph shows more manpower is needed to cut backlogs. And better labor effectiveness will help. Stronger preventive maintenance, against high percentage of day-to-day work, will boost maintenance performance.

Cost (Figure 4)—Here, many factors cause high unit cost. For example, high mechanical downtime and low manpower activity (Figure 5). High indirect maintenance shows need for tighter control to balance better with direct maintenance.

Productivity (Figure 5)—Indicates low manpower activity, low forecast effectiveness. The former may be due to poor planning and scheduling or poor foreman-to-worker ratio. The latter is organizational, caused by low percentage of work planned and forecast weekly. Decrease in units of product per maintenance dollar stems from high overtime, low manpower activity, high emergencies, and lack of sound preventive maintenance. These observations suggest training, organizational study, and corrective maintenance.

Improvement program — Interpreting the meaning of all factors of the four major functions now makes realistic improvement goals possible, and thus improvement of over-all maintenance performance. These goals are shown in the basic data summary sheet (Figure 1). Here's how we arrive at them:

Under *planning* we see each factor can show improvement. We can expect to improve labor effectiveness to 80%, man-hours forecasted to 85%. This should cut emergency work to 4%, overtime to 2%.

Under *work load* all four factors are vulnerable. So we set goals of 3 and 5 crew-weeks for current and total backlogs. Knowledge of plant conditions shows possibility of 30% preventive maintenance. Thus we decide on goals of 25% for preventive, 75% for day-to-day maintenance performance.

Under *cost* the four goals set up are practicable. The 15% for indirect maintenance is needed for experimental and development work. Thus you see local conditions dictate conclusions.

Now look at *productivity*. If we can reach 80% in labor effectiveness (Figure 2) and 75% in forecast effectiveness (Figure 5), we ought to reach 75% in manpower activity (ratio delay). And we can push forecasting effectiveness to 75%. These steps should cut mechanical maintenance downtime to 3%, lift units of product per maintenance dollar from 17% below base to 12% above base.

Having set our goals, we plot them (dotted lines in figures 2, 3, 4, 5, and 6) to see what the over-all result will be. In Figure 6 point performance (if all goals are reached) will rise from 28 to 69—an increase of 146%!

Timetables for improvement — Goals are good. But improvement won't come by itself. You need program schedules, engineering manpower, and resolution. Plus records to check progress.

Our program calls for broad action—organization, procedures and controls, planning and scheduling, preventive and corrective maintenance, standardization, training, maintenance work measurement. Timing and sequence is important. Some reforms are short-term, others continuing. For a typical 12-month schedule see Figure 7.

At the end of that period the graphic technique is again used to check results, point out factors that lag. Final results you have already seen. That's why we believe our yardstick is a reliable diagnostic tool for evaluating plant maintenance performance.

Reprints of this article are available. Price, 50¢ for single copies. For quantity prices, address The Editor, FACTORY, 330 West 42nd St., New York 36.

TYPICAL IMPROVEMENT PROGRAM WITH SCHEDULE

	SCHEDULE OF MONTHS TO BE EFFECTIVE											
	1	2	3	4	5	6	7	8	9	10	11	12
ORGANIZATION	●	●										
Structure	●											
Functions & responsibilities		●										
PROCEDURES & CONTROLS		●	●	●								
Work order		●										
Backlog		●										
Emergency & overtime			●									
Cost controls		●	●	●								
PLANNING & SCHEDULING			●	●	●	●	●	●	●			
Job preplanning			●	●	●	●	●	●				
Weekly forecasting				●	●	●	●	●	●			
Daily scheduling				●	●	●	●	●				
PREVENTIVE MAINTENANCE	●	●	●	●	●	●	●	●	●	●	●	●
Work load study	●	●										
Inspections & overhauls, etc			●	●	●	●	●	●	●	●	●	●
CORRECTIVE MAINTENANCE							●	●	●	●	●	●
Changes in design							●	●	●	●	●	●
Technological improvements							●	●	●	●	●	●
STANDARDIZATION		●	●	●	●	●	●	●	●	●	●	●
Crew sizes		●	●									
Job standardization—tools, etc			●	●	●	●	●	●	●	●	●	●
TRAINING	●	●	●	●	●	●	●	●	●	●	●	●
Selection & upgrading		●	●	●	●	●	●					
Mechanics training			●	●	●	●	●	●	●	●	●	●
Engineer & supervisory	●	●	●	●	●	●	●	●	●	●	●	●
MAINTENANCE MEASUREMENT				●	●	●	●	●	●	●	●	●

FIG. 7

TIMETABLE—Once weaknesses in maintenance performance have been spotted and new goals have been set up, Du Pont schedules improvements step by step.

TRACKING TRUCKS is a cinch with this plant map, some small magnets, and two-way radio.

Trucks When You Want Them

With a desk-size truck-tracking board (plus two-way radio), Parke Davis keeps tabs on every mobile unit, speeds handling throughout its sprawling plant.

NOW YOU CAN keep track — minute by minute — of fork trucks, tractors, and other mobile materials-handling units in your plant. How? With small magnets that your dispatcher can slide around on a plant map (photo above) — plus two-way radio. That's the way Parke Davis & Company (Detroit) does it. And here's what Parke Davis has gained:

. . . *Split-second service* for routine as well as emergency service.

. . . *A strong boost* for an already efficient handling system.

. . . *Better utilization* of mobile materials-handling equipment.

Cost? Only $65 — complete.

How the board helps—Parke Davis's Detroit plant consists of 67 buildings spread over some 10 city blocks. Eight city streets and seven railroad sidings skirt, enter, or divide the property. All this makes materials handling big business — and complex. And it makes speed and efficiency essential in dispatching. That's where the magnetic control board comes in.

There's a small magnet for each unit of two-way radio-controlled equipment at the plant. Magnets are ½-inch in diameter, each numbered and specially colored to identify the particular unit and type of equipment represented. The control board shows all buildings, docks, railroad sidings, streets, and yard areas in the 10-block property. Buildings also are numbered and colored for quick identification.

As trucks and other mobile equipment move about servicing various buildings and yards, the dispatcher keeps in touch with them by radio, moves magnets on her board to show where each unit is.

In emergencies — or whenever speed is needed — the dispatcher wastes no time thumbing through log sheets. She just glances at her board, spots nearest available mobile unit, calls it on her radio, and speeds it to the scene with split-second timing. Even routine requests get quick, efficient service.

What about equipment that's down for repairs or not available for some other reason? A small chart at the lower right-hand corner of the board is reserved for these units. It also shows equipment on routine assignment that needn't be tracked minute-by-minute.

To check on efficiency of materials-handling operations and provide a record of daily operations, Parke Davis uses daily log sheets and special recorders.

How to make a board—This one was built right at Parke Davis. This way: Place the plant layout drawing (made to scale) on a sheet of 14-gage galvanized iron. Cover it with a thin sheet of picture glass, frame it. Build a wooden base that will hold layout at convenient angle on dispatcher's desk. Install a fluorescent lighting fixture over the board. Be sure magnets are strong enough to stick on tilted surface of board.

7 Ways to Greater Productivity

Bottlenecks in your assembly line? Then let machines do the lifting and turning, take the load off your workers. With better methods like these we bring you from Hotpoint, you'll be on your way to higher speed and lower cost.

1. Applying a Dry-Film Lubricant

This machine (photo above) applies dry-film lubricant to sheet metal. The process has a dual purpose. It permits long storage of sheet metal. And it lubricates the sheet in preparation for fabricating operations, such as drawing.

A variable-speed slat conveyor—69 fpm. maximum speed—carries sheets from one end of the machine to the other. Each sheet passes through three operations—a hot wash, a lubrication applicator (rollers), a hot-air dryer. Guides along the sides of the conveyor keep sheets in line, eliminate jamming.

Two men handle the entire process. One loads the machine (at far end, not shown in photo). The other, pictured above, unloads the treated sheets. Variable-height hydraulic tables make both loading and unloading easy.

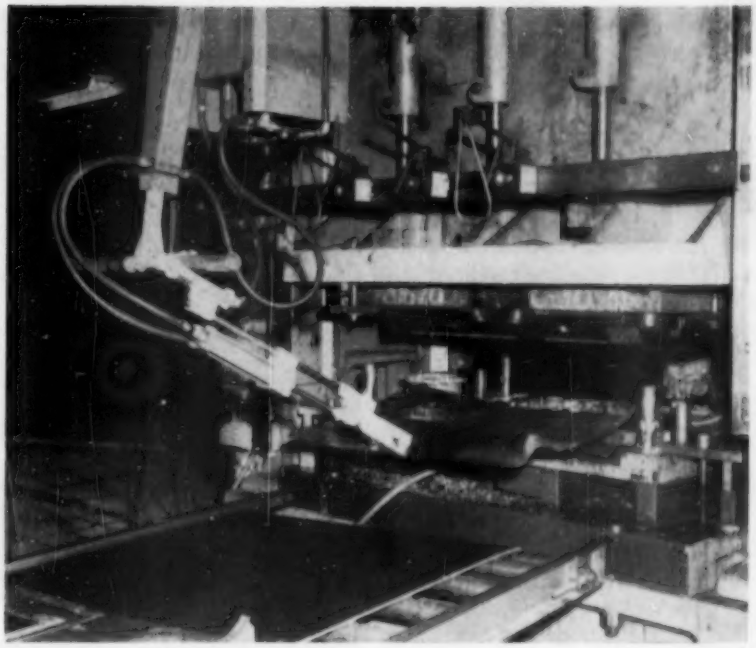
Changeover from dip-tank batch operations (formerly used) has yielded about a 20% saving in direct labor, about 30% in material (lubricant). Also new method is much cleaner. Fact is, output from batch operation was inadequate for the high production needs of Hotpoint's modernized facilities.

2. No Human Hands

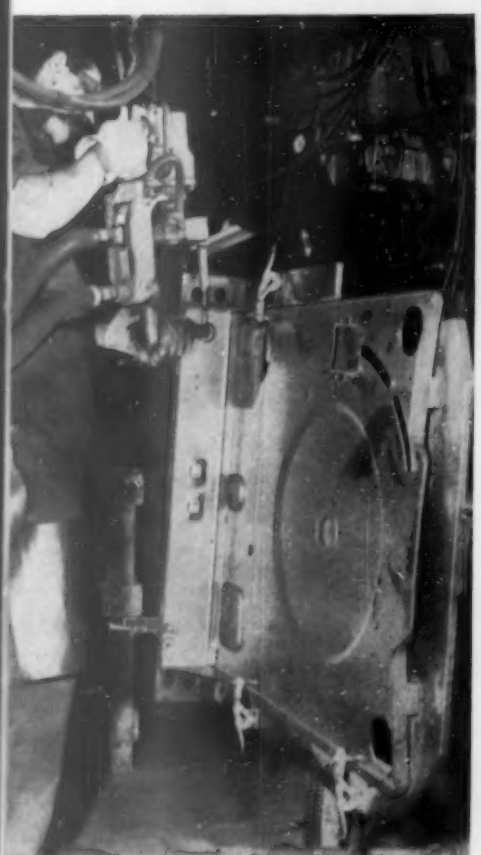
The mechanical hand (photo, right) replaces human hands in removing sheet parts—like washer panels—from heavy presses. These automatic, air-operated loading devices (made by Sahlin Engineering Company) are used on six presses in Hotpoint's new laundry building. Installed, they cost about $3200 each.

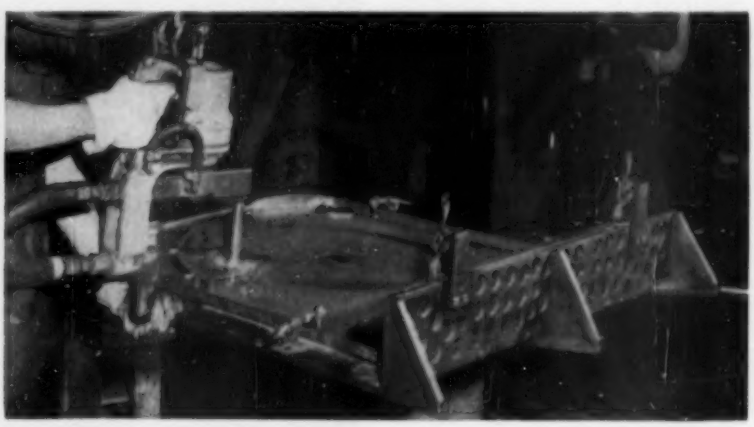
How does it work? Well, the press operator on far side of the press loads the sheet blank or semi-finished part in the press and then trips it. On the backstroke of the press, the mechanical hand reaches in, grasps the part, and pulls it from the press. The hand then releases the part, lets it fall to the motor-driven conveyor, which carries it on to the next operation. Size of hand depends on weight of part involved.

Operation of the hand is synchronized electrically with the press operating cycle. When the hand misses (not very often, according to Hotpoint's engineers), the operator pushes the part out of the press and onto the conveyor manually. In addition to replacing the press-unloading operator, the mechanical hand increases output of the machine.



Also important: The operator doesn't have to reach into the press any more. That way, he's safer than he was with the old method.





3. Holding Fixture That Moves

This holding, positioning, and gaging fixture can be used horizontally (above) or vertically (left). It positions the rear bulkhead assembly of dryers while brackets and gussets are welded on. The spot welder, hung from a counterbalanced hoist, rides on a monorail, can be moved aside when idle.

Operator fastens bulkhead assembly in horizontal position to fixture with six speed clamps. Then spots terminal block bracket in place with the welding gun.

Next, to attach two reinforcing gussets, he rotates fixture's hinged platform to vertical. Does this by stepping on pedal, thus releasing lock that holds platform horizontally or vertically. After welding one gusset, operator indexes platform 180 degrees (still vertical) and welds second gusset.

Fixture is home-made, inexpensive. Counterbalancing makes it easy to turn platform from horizontal to vertical when unlocked.

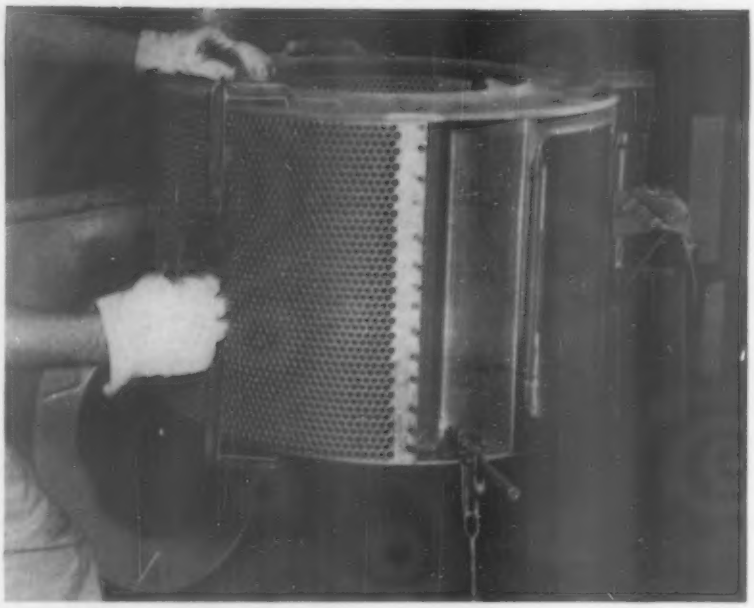
Turn the page

4. Assembling With Speed Clamps

For fast assembly of front and rear-end plates to inner dryer wall, quick-acting speed clamps are used. Operator first positions rear plate on simple rotating fixture. Then nests wall into plate so tabs in paddle recesses are flat against plate. These two parts are next clamped together with three triangular-head speed clamps. This way, they fit into paddle recesses, press tabs against the plate.

Finally front plate is fitted on top of wall, secured to rest of assembly by three rack-and-gear speed clamps like the one the operator is tightening (photo, right). All six clamps are standard equipment—with some minor modifications.

With clamping done, wall tabs are welded to front and rear plates.



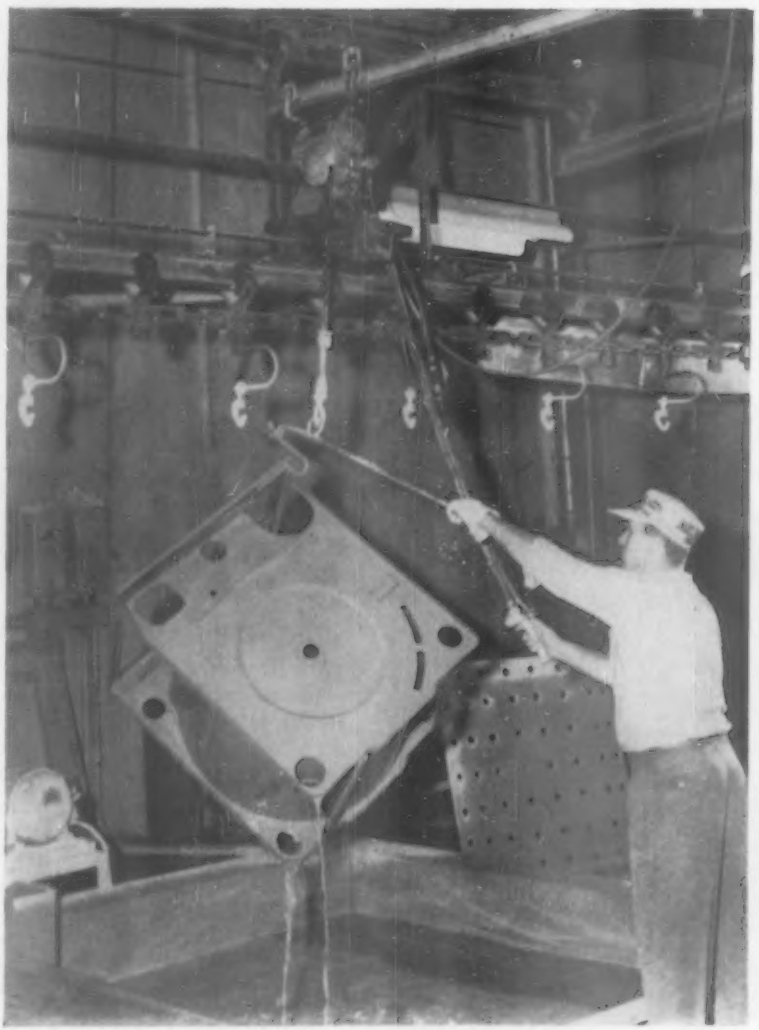
5. Dip Hoist for Vitreous Enamel

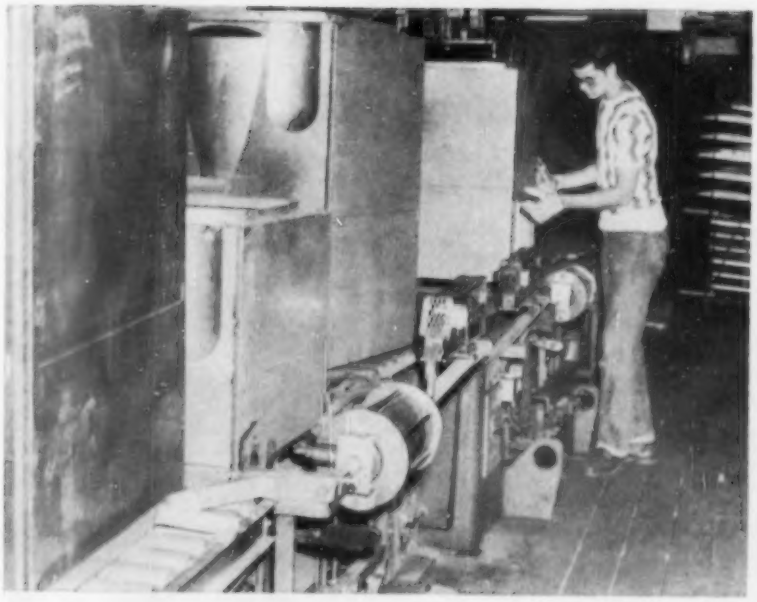
Hoist with three-way movement lets workers handle some 100 major parts per hour in ground-coat dipping. Pushbutton controls raise and lower parts into tank. Hoist has double lateral movement, rides monorail support one way. Monorail in turn rides curved end support.

Formerly a similar dipping operation required five men. Then the parts handled were smaller than the dryer chassis, which is shown in the photo at right.

Belt conveyor brings parts—while they're cooling—from pickling operation. While they're still on belt, operator fastens a specially designed hanger on each. (Each major part needs a different type of hanger.) Hoist operator picks up part (by its hanger) with small peel attached to hoist chain, then successively moves part over dip tank, dips it, hangs it on hook of overhead chain conveyor. Hooking onto conveyor is made easy by two-way lateral movement of hoist.

A third worker performs a cupping or touch-up operation.





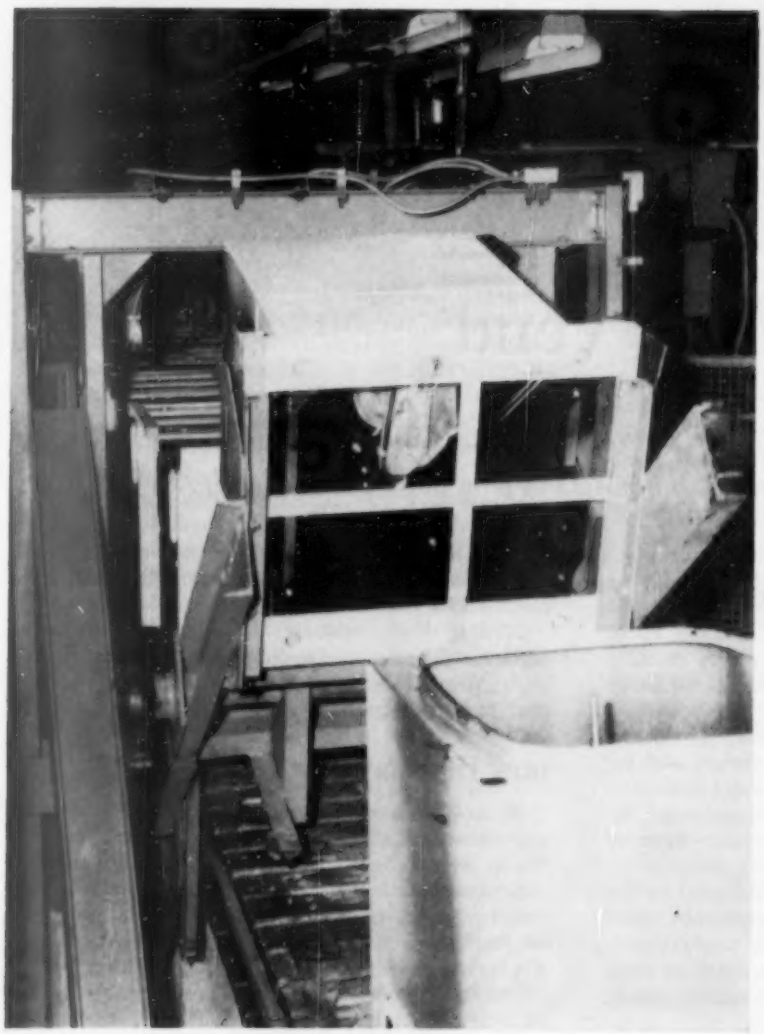
6. One Man Welds at Two Stations

One man runs the two-station welding machine at left. Here bulkhead is welded on four sides (two sides per station) to washer body. Operator positions bulkhead in body before placing it in first welding station, where he is standing in photo (left). Between stations, he rotates assembly 90 degrees.

Operator positions washer body with bulkhead in place on platform at first station, drops lever-operated platform to welding position, then pushes two buttons in safety enclosure. First button pneumatically moves electrode against outside of washer body (welding guns are inside), also lowers mechanism that holds bulkhead. Second button starts two banks of welding guns (20 guns each) sequencing. When first operation is done, platform rises automatically and assembly is transferred to conveyor by bulkhead positioning mechanism.

During first station's automatic cycle, operator loads the second. Operation is similar to above—but without need for a mechanism to hold bulkhead in position.

With this set-up Hotpoint keeps washer-body welding speed up to speed of the rest of the line.



7. Automatic Turnover Assembly

This mechanism (left) turns washers over as they pass along conveyorized line. Handles about 90 units per hour. Cycle is synchronized with conveyor speed.

Cost about $7500—but worth the money. Without it, two strong men would be needed.

Works like this: Washer assembly riding upside-down on conveyor moves into turnover. Washer's skid, extending beyond washer body, slides into arms of turnover. When in position, assembly is turned over, placed on conveyor right side up. As washer moves away, skid slides out of supporting arms.

Why are washers upside down? Because it's easier to assemble parts (motor and transmission) to the underside. After turnover, parts at top are assembled to body.

NO-HANDS CAFETERIA takes the headache out of food service at this Sylvania Electric plant. Automatic vending is the trend today—even at larger plants. It saves time, solves the swing-shift problem, turns a neat profit.

The Trend Is to Vend

Newest, biggest survey shows skyrocketing use of vending machines for in-plant feeding. And uncovers lots of other data to help make your food service tops.

BETTER THAN 8 OUT OF 10 American manufacturing plants are using vending machines today to help solve the problem of factory feeding. Over 1 out of 5 depend entirely upon automatic vending. These are the key statistics uncovered in a survey recently completed by the Field Research Division of the Paper Cup & Container Institute, New York.

The over-all picture of in-plant feeding also shows considerable growth. Of 1264 plant officials who replied to the survey, 55% reported they are now serving food, whereas 39% said they had expanded in-plant food service or had installed new types of service in the past two years.

That this growth is continuing, is indicated by the fact that more than 18% of the respondents report that they plan to expand or install new in-plant feeding facilities within the next two years; 70% of these are expanding primarily to improve service to present plant personnel.

Other highlights of the Institute's survey:

. . . *The half-hour lunch period* for office as well as plant workers is becoming dominant.

. . . *Half of all employees,* even in plants with food service, still bring lunches from home.

. . . *More than 50% of all plants* turn food service over to outside specialists.

HOW THE SURVEY WAS MADE

Basic data for the survey were obtained by mail questionnaires addressed to 4976 industrial plants. These were selected so as to be representative of American industry in type of product, gross annual dollar volume, geographic distribution, and number of employees. Although plants with less than 250 workers represent 96% of U.S. manufacturing establishments, they were not given proportionate weight in the survey because so many of them employ less

than 50 people and do not provide feeding facilities.

Replies came from 1264 plants in 37 states. Distribution by size is shown in this table:

RESPONDENTS BY NUMBER OF EMPLOYEES

Size of plant	No. of plants	Respondents
Less than 250 people	560	44.3%
250-499	283	22.4
500-999	218	17.2
1000-2499	135	10.7
2500 and over	68	5.4
Total respondents	1264	100.0

Top management's interest in employee feeding is perhaps indicated by the rank of the executives who took the trouble to fill in the four-page questionnaire. Of 1229 who stated their position, 303 were general managers or corporate officers, including 79 presidents; another 824 were middle management men such as plant managers, superintendents, and industrial relations directors.

FEEDING FACILITIES BY SIZE OF PLANT

No. of employees	Under 250	250-499	500-999	Over 1000
Provide food service now	30.8%	63.1%	74.8%	91.1%
Plan to provide	2.0	2.5	.9	1.5
Expanded in past two years	32.2	45.6	37.4	39.0
Expand in next two years	10.8	13.4	21.6	26.2

The larger the plant, the more likely it is to provide food facilities. In fact, almost all plants with more than 1000 employees have food service. Those without service do not plan to offer it in the future. On the other hand, 26% of plants with more than 1000 employees are planning to expand feeding facilities in the next two years; 39% report such expansion within the past two years.

Some longer-term trends in factory feeding are discernible as a result of a somewhat similar survey made in November, 1950 (FACTORY, May 1951). Results of the two surveys are not precisely comparable because the 1950 survey was restricted to plants serving food, and because the recent survey used a far larger and more representative sample. However, some of these comparative percentages are revealing:

. . . While interest in food service was intense in 1950, management did not seem to anticipate the magnitude of its needs. Plans for expansion were then reported by only 19%. New survey shows that 39% of plants reporting expanded service within the past two years.

. . . Most underestimated was the use of the vending machine. In 1950, only 12½% said they planned to add vending machines; in 1955, 79% of plants had installed them.

. . . Predictions as to type of facility to be expanded do not appear to conform to action taken. In 1950, 46% of respondents (who indicated plans for expansion) said they expected to expand their cafeterias. In 1955, 31% said they had done so in the past two years. Again, in 1950, 23% looked to growth of food carts or mobile units. Only 13% added them in the past two years.

FORECASTS FOR THE FUTURE

Of the 148 plants that expect to expand or install equipment in the next two years, 106 reported their plans. About 53% plan to expand cafeterias, 18% look for more snack bars, 15% favor mobile units, and 48% list vending machines.

Reasons for offering food to factory workers appear to fall into three major classifications. Number 1, with 50.2% making the statement, is company policy. Only 1% reported that their union contract required food service. This ties in with statements made in 1950 when a General Motors spokesman, for example, said:

"We aren't trying to make industrial feeding pay out in terms of higher productivity in dollars and cents. We're satisfied if it helps morale."

Number 2 reason, cited by nearly 50% of respondents, is lack of restaurants and cafeterias near plants, which may be characteristic of plants away from urban areas. Number 3 reason, "lunch period too short to leave building," was given by 44.7%.

LENGTH OF LUNCH PERIODS

	¼ hr.	½ hr.	¾ hr.	1 hr.
Shop workers—'55	4.5%	80.2%	5.1%	10.2%
Shop workers—'50	11.4	69.0	8.2	11.4
Office workers—'55	.8	41.5	19.2	38.5
Office workers—'50	1.8	30.9	21.7	45.6

For both office and shop workers, the half-hour lunch period is apparently becoming the norm in manufacturing plants. As indicated in the tabulation, the Institute's 1950 survey showed that 69% of plants had half-hour lunch periods for shop workers. In this survey the figure has risen to more than 82% of plants reporting. For workers in factory offices, the trend is in the same direction.

EMPLOYEES BRINGING LUNCH FROM HOME

87	plants	said	less	than	19%
120	"	"	"	"	39%
162	"	"	"	"	59%
141	"	"	"	"	79%
110	"	"	more	"	90%

It is difficult to assay reasons for patronage of factory feeding facilities or even to estimate with any accuracy the degree of their use by employees because of seasonal variations, differences in quality of food offered, range of facilities, local customs, and availability of competing food services in the area. For example, more than 10% of respondents report that 90% of their employees still bring lunch from home. Twenty of the 382 plants with cafeterias say that 80% or more of their employees are not using them. Cer-

"Soup's on! That's the big news in food vending"

tainly in many industrial plants a vast increase in patronage is still possible.

FACILITIES USED BY SIZE OF PLANT

Facility	Under 250	250-499	500-999	Over 1000	%
Vending machines	87.5%	84.2%	81.0%	81.6%	83.5%
Cafeteria	26.8	42.9	66.9	81.6	55.0
Canteen or snack bar	14.3	16.4	14.1	22.2	16.8
Food carts	23.2	28.2	26.4	32.4	27.6
Other	7.1	4.5	3.1	0.3	4.5

(Percentages total more than 100 because some respondents gave more than one answer)

Analysis of type of food service offered shows a high proportion of vending machines. Back in 1950, only 171 of 240 reporting plants used these machines. In the present survey, 580 out of 695 plants were using machines—more than any other type of service. Thus, while more people are probably still fed in cafeterias and cafeteria menus are undoubtedly broader, five out of six respondents said vending machines are used in their plants for serving food or beverages. Clearly these machines are often supplementary services, since many of the plants also had cafeterias, canteens, or mobile food units. For example, of 382 companies operating cafeterias, 308 also used food vending machines.

Considered on a size-basis, smaller plants make slightly more use of machines than those with 500 or more employees. This is to be expected because the machines make it possible to feed comparatively small groups of people at a reasonable cost. On the other hand, while 88% of plants with more than 2500 employees report they have cafeterias, 76% also have vending machines.

Although automatic merchandising equipment for food has been available since well before World War II, nearly 40% of plants now using them started to do so for the first time during the past five years.

FOODS NOW BEING SOLD IN VENDING MACHINES
(580 Plants Reporting)

Item	Plants serving	Item	Plants serving
Soft drinks	572	Fruit juices	57
Candy and gum	462	Sandwiches	27
Coffee	268	Soups	20
Milk	219	Fresh fruit	7
Ice cream	164	Potato chips	6
Hot chocolate	76	French fries	2
Pastries	75	Stews, etc.	1

FROM SOUP TO NUTS. That's the range of vending machine service within the next couple of years. Machines already serve thick soups, stews, chili, goulashes—food that sticks to the ribs of industrial workers.

One main reason for popularity of vending machines is the increase in variety of foods and beverages that can be handled. At the close of World War II, plants offered on the average only 1.1 different items through machines; now the average is close to 4 items.

A good part of this increase has been the result of design progress—development of a compact refrigeration unit that chills beverages and keeps food from spoiling; finding ways to use paper cups and containers to solve problems of sanitation, convenience, and safety; and, recently, development of methods of keeping food warm.

With the large proportion of soft drinks, candy, nuts, and gum shown (see table), it is easy to continue to think of machines as purveyors of only the lightest snacks. But a trend toward mealtime foods is indicated in reports from 122 plants with machines as their only feeding facility. Eighteen have 500 to 999 employees; 11 have 1000 or more workers. And 97 are using machines for such items as coffee, milk, ice cream, sandwiches, etc.

WHERE VENDING MACHINES ARE PLACED

Location	No. of plants
Working areas	311
Halls or corridors	282
Stations of two or more machines	145
Special rooms with chairs and tables	56
Employee recreation rooms	47
Cafeterias	34
Other	7

(563 plants named one or more of these locations)

Most plants take advantage of the small amount of space and simple mechanical arrangements required by vending machines, and do not set up elaborate installations. About one plant in every four groups machines in batteries at "vending stations"; but most companies simply place machines in working areas or in halls or corridors where traffic is high.

About one company in 10 has established a special room with chairs and tables. Plans for such facilities were disclosed by a relatively large number of the plants that reported they expect to add to existing vending machine operations.

EFFECT OF UNRESTRICTED USE OF VENDING MACHINES ON PRODUCTION*

Does not disrupt production	312 (72%)
Disrupts production	79 (18%)
No reply	45 (10%)

*Reported by 436 plant managers who do not restrict use.

In view of the fact that machines are usually placed within short distances of the employees' regular working stations, it is interesting to find there is little restriction as to use—and without apparent bad results. Of the 564 managers discussing the subject, 436 stated they have no restrictions; 121 follow a rule that machines can be used during lunch and relief periods; while only 7 hold machines to lunch periods.

Managers allowing unrestricted use agree 4 to 1 that machines do not interrupt production.

Part of the success in vending with so little restriction probably lies in the fact that the machines are generally in public places.

WHO DECIDES ON USE OF VENDING MACHINES?

Director of personnel	59%
Plant manager	51%
Employee association	9%
Caterer	5%
Food manager	3%
Union	1%
Others	7%

(Some plants reported more than 1 person responsible.)

The decision on use of vending machines usually rests with the director of personnel, the plant manager, or both. These men watch the service carefully, but more than 9 out of 10 prefer to have a contract with one or more contractors who carry the day-to-day responsibility for their operation.

WHO MANAGES FOOD SERVICE?*

(553 Plants Reporting)

	Under 250	250-499	500-999	Over 1000
Plant food supervisor, personnel manager	29.3%	34.4%	33.1%	42.2%
Catering or industrial feeding company	46.2	51.1	57.7	54.3
Miscellaneous others	24.5	14.5	9.2	3.5
Total respondents	100.0	100.0	100.0	100.0

(*Other than vending machines)

While more than 90% of those plants that have vending machines look to outsiders for management, other types of food service are still frequently managed by the company itself as shown in the chart.

INCOME FROM VENDING MACHINES

(360 Plants Reporting)

Income per year	No. of people employed: Under 250	250-499	500-999	Over 1000
Under $100	20.4%	6.1%	—	1.1%
100 - 499	58.0	37.8	30.1%	4.4
500 - 999	13.6	27.6	19.3	12.2
1000 - 4999	5.7	25.5	44.6	50.5
5000 and over	—	—	2.4	28.5
Unspecified	2.3	3.0	3.6	3.3
	100.0	100.0	100.0	100.0

Of the plants using machines, 91% report they receive a percentage of gross receipts from vendor. Less than 10% state vending companies pay nothing.

Profits from the machines frequently amount to more than $1000 a year and were reported in two exceptional cases at $15,000 and $75,000.

HOW INCOME FROM VENDING MACHINES IS USED

(516 Plants Reporting—some list more than one use)

Employee recreation, entertainment or benefits	81.8%
Other food services	18.8%
Union	2.1%
Company funds	1.2%
Charity	1.6%
Other	2.1%

Since most companies do not plan to make a profit on employee food service, income from vending machines is channeled to benefit the employees by more than 80% of plants reporting.

Nine Ways You Can Act on This Survey

1. Make in-plant feeding an important policy consideration. It's no longer a bare necessity.
2. Plan to spend money to improve feeding facilities if your plant is to remain competitive.
3. Reassess your entire feeding procedure to be sure it *really* suits the needs of your employees.
4. Speed up your cafeteria service to gear it to the now-predominant half-hour lunch.
5. Consider hiring an outside specialist to run your cafeteria—if you're not doing so now.
6. Study ways to make your food service more attractive to increase total patronage.
7. Cut worker-time lost snacking by installing vending machines right on the factory floor.
8. Solve overtime and night-shift feeding problems with vending machines.
9. Increase your income from food service by extending usage of vending machines.

FACTORY | IDEAS OF THE MONTH

By LEWIS K. URQUHART, Managing Editor, FACTORY

Micro-feractors, which you'll be hearing a lot more about, are no bigger than the eraser on the end of your lead pencil. Now being used in Remington Rand's newest ($12,500) electronic computer. No filament tubes. No transistors. Seems micro-feractors will perform accurately at temperatures ranging from 60 below to 200 above zero. For details write RR at 315 Fourth Ave., New York 10.

New calking compound made from a chemical polysulfide (Thiokol Chemical Corp., Trenton) may solve leakage problem. Cost: $19 per gal.

Aluminum studs end-welded to the steel framework were used to secure the corrugated aluminum skin of that dome-shaped, bulk-storage warehouse recently completed by Kaiser Gypsum Co., Long Beach, Calif. The sheeting was impaled over the studs with rubber hammers. Ends of studs were then upset. Labor saving, reports Nelson Stud Welding (Lorain, Ohio) was at least 50%.

Now the tinless tin can! Seems American Can Co. has a new food can with an aluminum (instead of tin) coating — with enamel-coated insides and welded (instead of soldered) sideseams. Canco's goal is elimination of tin and other strategic materials from metal containers.

Graphic reproduction is the newest thing in radio communication. Motorola (4545 W. Augusta Blvd., Chicago) reports that maps, drawings, and photos have been successfully relayed over microwave between Chicago and Houston. Proves it by sending along glossy reproduction of facsimile copy.

Booklet of the month is *Engineers' Job Directory* (Decision, Inc., 105 E. 4th St., Cincinnati 2). EJD contains brief info on 250 companies employing thousands of engineers and scientists. Price: $3.25.

The trend is to vend (see page 92). Especially hot food. So you'll be glad to know about the coin-operated canned-soup dispenser developed by Campbell and The Vendo Co. (7400 E. 12th St., Kansas City, Mo.) The new machine holds 210 8-oz. cans and dispenses up to three kinds of soups at 150 deg. F.

P-T-E Analyzer helps you determine operating efficiency of motor-driven machines by measuring the productive time and energy involved. Gives you standards to compare work input and work output. Stewart Instrument Co., Detroit.

Spin-O-Gram is a safety gimmick you can get from Award Incentives, Inc. (200 William St., New York 38). It's a stamped disc — with incomplete words on each side. When the disc is spun, it spells out a slogan (such as "Play it safe" — or write your own). Can be used as a registered key tag.

Electric parking gates (Western Railroad Supply Co., 2428 S. Ashland Ave., Chicago 8) operate with coins, tokens, or keys. May well be the answer to your parking problems. No attendant needed. No unauthorized parkers.

Temperature conversion table (get your free copy from Thermo Electric Co., Inc., Rochelle Park P.O., N. J.) is mighty handy, especially if you can't remember the formula. It converts degrees F. to C. and *vice versa*. Also shows temperature range of thermocouples, resistance bulbs, etc.

Liquefied petroleum gas, with 25 applications in industry, may be worth looking into. May we suggest a little booklet (reading time, 15 min.) prepared by Gulf Oil Corp. (Gulf Bldg., Pittsburgh)? Gives you a non-technical explanation of characteristics and use. Ask for *LP-Gas, the Cinderella Fuel.*

Who's going from your company to the third Annual Material Handling Conference? It's scheduled for June 17 to 30 — at Lake Placid, N. Y. Write James Bright, director, 56 Robbins Rd., Lexington 3, Mass. Cost, $850.

Cold feet? Not with a General Industrial (5750 N. Elston Ave., Chicago 30) foot-warmer. It's a 14x21-in. neoprene mat that uses less power than a 75-watt lamp. $7.95 postpaid. For office, lab, production line.

Calculator of the month is the dual-purpose job offered for $1 by Cincinnati Milling Machine Co., Cincinnati 9. One side designated "Milling Set-up," is used to determine spindle speeds and feed rates adequate for toolroom operations, job-lot milling, or short production runs. On the other side, entitled "Economic Cutting Speed," a modified cutting speed can be determined that will give you minimum cost per piece for high-production milling jobs.

Economic time planner, 1956 edition, has been announced by Barrington Associates (230 Park Ave., New York 17). Distributed free to executives who like to schedule long-range commitments up to a year in advance.

Slave typewriter, a solenoid-operated machine developed by Underwood Corp. (1 Park Ave., New York 16), gives you split-second typewritten recordings of instrument readings — at the rate of 11 characters per second.

Doorless doorway (from Switzerland) is being tried out in a Cincinnati supermarket, may rate consideration when your company plans its 1960 plant. A curtain of air (warm in winter, cool in summer) acts as insulating wall to protect interior from outside weather. No need to hang onto your hat, either. There's no draft. American Air Curtain Corp., St. Louis.

HOW TO PREPARE A MAINTENANCE MANUAL FOR EASY USE

First objective is to enable people to find what they want, quickly and easily. Second objective is to record information in a uniform manner so that people become accustomed to it.

You can achieve the first by a simple numerical index to establish the manual's sequence by section numbers. Assignment of item numbers in steps of 10 permits easy interpolations later.

Your procedures engineer can help establish a standard format for the subject matter on each item. This will gain the second objective. Page at far right shows the procedure sheet on "Roofs," Item No. 80. At the top of that page are listed seven points (*a* to *g*) that appear on all items. They give uniform and fast-reading reference data. Below these is information maintenance people will need to maintain and service the specific item.

Numerical List of Building and Grounds Maintenance Manual

ITEM NO.	SUBJECT
	LAND AND BUILDING STRUCTURES:
10	Land
20	Foundations
30	Floors
40	Side Walls (Exterior)
50	Platforms
60	Canopies and Awnings
70	Structural Members
80	Roof
90	Roof Mounted Structures
	INTERIOR SURFACES:
100	Walls
110	Ceilings
120	Columns
130	Partitions
140	Doors
150	Windows
160	Stairways
170	Shafts
	INTERIOR EQUIPMENT:
180	Lighting Fixtures
190	Wiring
200	Plumbing and Piping
210	Heating Systems
220	Dust Removal Equipment
230	Sanitary Facilities
240	Lockers and Washrooms
250	Drains and Sewers
260	Firefighting Equipment
270	Guardrails
280	Air Conditioning Equipment
290	Elevator Equipment
300	Structurally Attached Material Handling Equipment
	YARD EQUIPMENT AND STRUCTURES:
310	Pavements and Driveways
320	Landscaping and Trees
330	Walks
340	Hydrants
350	Watersphere
360	Incinerator
370	Coal Silo
380	Ash Silo
390	Tank Farm
400	Pumps
410	Sewers (Exterior)
420	Tunnels
430	Railroad Sidings
440	Fences
450	Signs (including Traffic)

CROSS-REFERENCE INDEXING helps workers and supervisors find what they want to know in a hurry. Numerical index establishes manual's sequence.

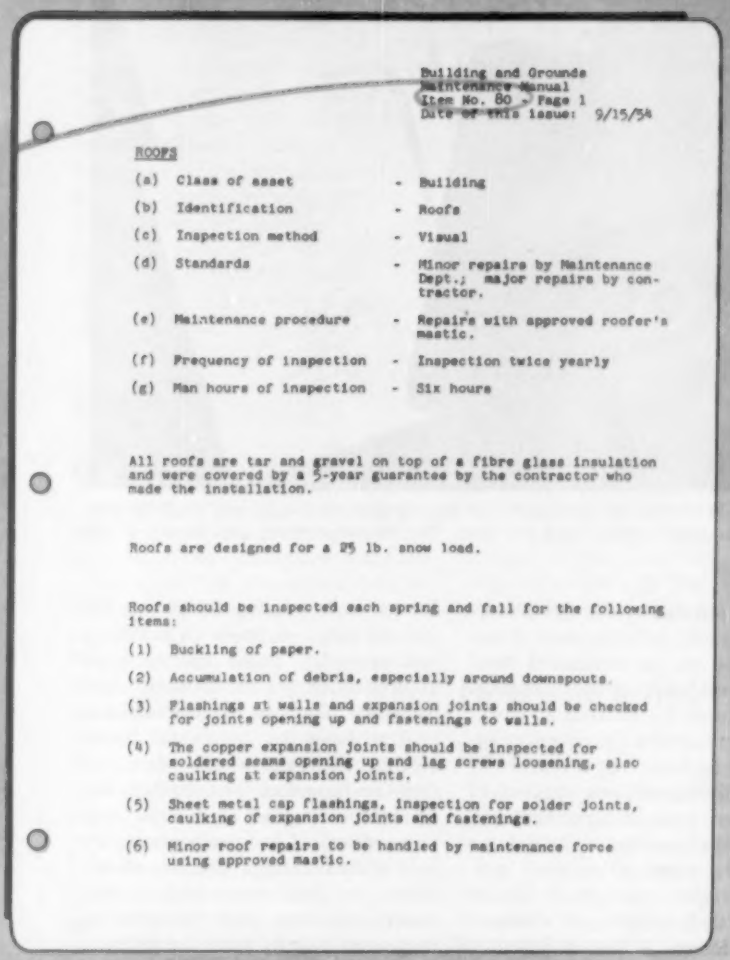
Why Not a Maintenance Manual?

Why not set up procedures to keep plant buildings in top operating condition? Why not save time for your maintenance force? Why not cut maintenance costs?

EVERYONE AGREES maintenance is increasing in importance and complexity in today's modern plants. A. B. Dick Company is no exception. So it seemed only natural for us to compile a "Building and Grounds Maintenance Manual" that outlines procedures and practices of handling maintenance problems for buildings and grounds. We had used similar manuals for office and production procedures. Then why not for maintenance?

Here's another viewpoint: Our buildings and grounds must be systematically cared for. If they are not, we can't hope to increase efficiency, reduce operating costs, keep equipment functioning properly, and lengthen life expectancy of capital assets. Today, after using our maintenance manual for more than a year, we feel it has helped us a lot to achieve these goals through established standards for maintenance of plant properties.

By F. R. MALMGREN
Building Superintendent
A. B. Dick Company, Chicago



Building and Grounds
Maintenance Manual
Item No. 80 - Page 1
Date of this issue: 9/15/54

ROOFS

(a)	Class of asset	-	Building
(b)	Identification	-	Roofs
(c)	Inspection method	-	Visual
(d)	Standards	-	Minor repairs by Maintenance Dept.; major repairs by contractor.
(e)	Maintenance procedure	-	Repairs with approved roofer's mastic.
(f)	Frequency of inspection	-	Inspection twice yearly
(g)	Man hours of inspection	-	Six hours

All roofs are tar and gravel on top of a fibre glass insulation and were covered by a 5-year guarantee by the contractor who made the installation.

Roofs are designed for a 25 lb. snow load.

Roofs should be inspected each spring and fall for the following items:

(1) Buckling of paper.

(2) Accumulation of debris, especially around downspouts.

(3) Flashings at walls and expansion joints should be checked for joints opening up and fastenings to walls.

(4) The copper expansion joints should be inspected for soldered seams opening up and lag screws loosening, also caulking at expansion joints.

(5) Sheet metal cap flashings, inspection for solder joints, caulking of expansion joints and fastenings.

(6) Minor roof repairs to be handled by maintenance force using approved mastic.

TYPICAL PROCEDURES PAGE is this one covering roofs. Format was designed by one of A. B. Dick Company's procedures engineers.

What we (you) get out of it

Putting a manual together is hard work. You've got to keep plugging at it. So unless you have a vision of whether all this mental sweat is worthwhile, you're liable to drop on the trail.

We are realizing many benefits from our manual, all adding up to reduced manufacturing costs through better maintenance planning. Our written record of procedures is a big step toward:

. . . Insuring continuity of good service. By recording important facts and figures about our buildings and grounds, we have eliminated the "key man" situation. In the past too much critical information about plant maintenance was carried in one or another man's head. If something happened to such a man (temporarily or permanently), it created a problem in the maintenance department until his replacement caught on. This "breaking-in" period might take a year or longer. Now he has a written guide, need not be a pioneer.

. . . Establishing sound maintenance procedures. By setting up timetables and specifications for inspections, we have eliminated hit-and-miss maintenance—encouraged more effective preventive and routine maintenance. By keeping a close watch on possible trouble spots, we prevent breakdowns in both structures and equipment. Thus we reduce emergency situations.

. . . Using latest methods and techniques. When we find a better method for doing any maintenance job, we record it in the manual. This updating means constant revision, of course, but the manual's loose-leaf design lets us add or delete individual pages or sections with minimum effort.

. . . Providing a historical record of obsolete procedures. Superseded pages or sections, filed carefully, will provide this information. I say "will" because our manual hasn't been in use long enough for us to realize major benefits from this function yet. But in the future we expect this file to be helpful. It should eliminate duplication of effort by providing a ready reference for checking suggested "new" procedural changes.

. . . Setting maintenance quality standards. Our manual tells maintenance workers and foreman alike what quality standards must be achieved and maintained. Our 635,000-sq.-ft. main plant is relatively new (it was completed in 1949) and in excellent operating condition. To keep it this way we can tolerate no slipshod workmanship.

. . . Assuring better planning. On many (as yet not all) of our inspection procedures, we have established time standards. These standards, together with the prescribed inspection frequency that is recorded in the manual, help maintenance foremen to schedule work for better use of manpower.

. . . Providing a time-saving reference. The manual's cross-reference index helps find the right information in a minimum of time. With a book the size of our manual (about 200 mimeographed pages) good indexing is a necessity. Without it maintenance men would have trouble locating what they wanted in a reasonable amount of time.

. . . Setting safety requirements. Comprehensive safety regulations—some general and some specialized by crafts—tell workers what they should and should not do on their jobs. These rules are given to outside contractors as well as our own maintenance people.

For what to put into a manual—and costs—turn the page

What our manual covers

200-PAGE MANUAL is loose-leaf, for easy revision and addition. Each copy is bound in a sturdy cover. Cost per copy (for mimeographing and cover): $7.85.

What information you want to include in a manual like ours is largely a matter of objectives. You need to balance utility against cost. The broader the scope and the more detailed the coverage, the more time and effort are required to compile the necessary data and keep it up to date. Based on our experience, I'd like to stress one conviction right now. Regardless of coverage, you can never get a manual that is 100% perfect and up-to-date. If you aim for this before issuing a manual, you will waste time and never get it into publishable form. So I recommend you issue it when you think it has reached a reasonably useful stage. Then add to it as time and experience provide new material of value.

Our manual contains only maintenance data pertinent to our buildings (including plant services) and grounds. It does not include production equipment, which is maintained by a separate department under a master mechanic. Such a manual may follow later.

The major portion (about 110 pages) covers, in individual sections, 46 physical parts (including service equipment) of our buildings and grounds. This portion of the manual is subdivided into four main categories, each of which is broken down further by items. Here are the four categories: (1) Land & Building Structures, (2) Interior Surfaces, (3) Interior Equipment, and (4) Yard Equipment and Structures. Items under these headings will be found in the numerical list (see opening page of article).

In addition to treatment of all parts of our buildings and grounds, the manual contains eight more sections of special information. These were included because we considered their contents valuable and helpful to our people responsible for the upkeep of our buildings and grounds. They cover:

. . . *Painting specifications.* Includes 22 pages of detailed instructions and information on all phases of painting and finishing used in our plant. This section eliminates need for decisions on painting standards or procedures by individual workmen or contractors. It covers preparation of surfaces, requirements by specific building sections, methods of application, material specifications, and care of equipment. The data on each of the subjects are both general and highly specialized. A list of causes and remedies of common painting defects is also included.

. . . *List of purchased items.* Provides a detailed 39-page reference of all purchased and installed items. Each building is listed individually, with contractors according to items furnished. Copies of all purchase orders are filed in building superintendent's office. Often it would be difficult to determine specifications of a piece of purchased equipment or where a replacement can be secured. This list gives us both in short order.

. . . *List of original contractors.* Here we have a complete 5-page alphabetical listing of the 2 general contractors and the 160 sub-contractors who built our plant. It gives name, address, telephone number of each. This section was included for two reasons. It tells who is responsible for what during period of guarantee. And it documents where replacements or additions can be secured.

. . . *Indexes of architects' and engineers' drawings.* Four sections of the manual, totaling 25 pages, list 567 drawings pertinent to buildings and grounds. These indexes save us time when we are looking for a particular blueprint. Index sections, broken down by individual buildings, list the sheet number, title, and latest revision date for each drawing. Actual drawings are filed in the blueprint room, while specifications are held in the buildings superintendent's office. In most cases our maintenance men can pick the drawing they need directly from the index.

. . . *Maintenance safety rules.* This section, mentioned earlier, contains 17 pages and is subdivided into four parts. These deal with general safety standards, special safety rules for millwright and machine repair work, a similar set of special regulations for electrical maintenance, and safety rules for outside contractors. There is also a bulletin on how to administer artificial respiration. We included this extensive safety section to combat the high accident frequency and severity rates normally associated with maintenance work.

Basic data—At the top of the page are listed seven points (a to g) of standard information we want on each item. For details, see the "Roofs" sheet shown on the previous page. Every sheet on physical property leads off this way.

Procedures—Below these basic data we record any information we think our maintenance people will need, such as description of item,

precautions to be taken, and best methods to be followed. In some cases we might also elaborate on special maintenance procedures.

However, we regret we did leave out one important factor. We failed to specify which craft is responsible for execution of each prescribed maintenance procedure. By this omission, we've created some confusion. We intend to correct this by making the necessary manual revisions as soon as possible.

How we handle revisions

Keeping a manual like ours up-to-date is an all-important, continuing process. If the recorded information is not up-to-date, the manual's value is greatly depreciated.

After all, a manual is only a tool —a guide to better maintenance. It spells out the best procedure you know at the present time. But this doesn't mean you should close the door to new developments and products. You should always investigate better ways to do things. And when methods are improved, the manual *must* be revised, and promptly.

We find revisions fall into two general categories—urgent and routine. Urgent revisions cover changes that must be made effective at once. In such cases we issue a revised manual page or a supplementary sheet as soon as possible.

Routine revisions require less urgency. They usually deal with minor changes in procedures or materials, such as altering a method of floor treatment. We keep notes of these procedural changes in a special file until several have accumulated for a given item. Then we incorporate these minor changes in one over-all revision. Of course, if an urgent or major revision is needed on an item, the minor changes are made at the same time.

Upkeep of the manual becomes virtually mechanical after a good revision procedure has been established. Except for approval of revision a clerk can easily handle the job on a spare-time basis.

Revisions at A. B. Dick are always issued on new manual pages. These are placed in the manual's loose-leaf binder to replace superseded data. Obsolete pages are then returned to our department and filed by item number for reference.

We purposely issue new data sheets rather than supplementary sheets. Our maintenance people must study the entire sheet to find what has been changed. This makes for a better informed maintenance group.

Shortly after we published our manual, our new 80,000-sq.-ft. West Building (office and research facilities) was completed. Many of the procedures already included in the manual applied to this new structure. The section on floors is a good example. However, other items in the new building, such as mechanical equipment and roof structures, will require entirely new sections. Foreseeing this possibility, we provided extra space in both the index and the body of the manual.

How much did our manual cost?

It's impossible for us to put a dollar-and-cents value on the development cost of our one-volume maintenance manual. It was developed by my office on a spare-time basis. Therefore, we didn't log actual man-hours spent on it. However, I can say on an intermittent spare-time basis it took us about three calendar years over-all to produce.

I wrote about 90% of the manual myself with the cooperation of the people in my own and other departments, from information gathered over the years. The remaining 10%, including such sections as painting and landscaping, was done by people within the company specializing in these fields.

To publish the manual, duplicating charges were $4.85 per copy. And the husky loose-leaf binder for each manual cost $3.

Who gets a copy of the manual?

So far, we have distributed 52 copies. Each manual is numbered so we know exactly who has it. The person to whom the manual is assigned is responsible for keeping his copy up-to-date by inserting revisions as they are received.

The foreword of our manual was written by our vice-president of manufacturing. He points out the value of the manual in efficient maintenance of company assets. And he requests that all holders keep it current by prompt insertion of correction sheets issued by the building superintendent. This seal of approval has extended its application to those departments not under the direct jurisdiction of the building superintendent.

The manual is distributed to:

. . . *Ten top-level company executives*—to keep them informed of current operating procedures. Also as a guide for checking any observations they make during plant tours.

. . . *Certain department heads*—12 in all—for the same reasons as the top executives. This group includes our production and service executives as well as maintenance department heads.

. . . *Each of our 10 maintenance craft groups*. Also some individual maintenance workers where shift and special assignments require such action. This calls for 26 books.

. . . *Each contractor working at the plant*. He receives two copies on a loan basis. One is kept at the job by the superintendent, while the other is taken to the contractor's office for the use of the design men. We do this so that new work on our buildings and grounds will be in line with established company standards. Four copies of the manual are reserved for this purpose.

IS THE MANUAL WORTH THE EFFORT?

We think so. We know the manual is used night and day by our 119 maintenance workers and supervisors. The index of engineering drawings alone has saved our people endless hours of searching for the right print. Also, since the maintenance manual was published our foremen have been questioned less regarding procedures by their men. You know the kind of questions I mean: "How do I do this?" or "What do I do here?" There's little room now for the "I-didn't-know-how" excuse.

1 RECEIVING. Three men in two hours unload 2000 pieces of luggage onto sections of Rapistan skatewheel conveyor. Men work inside warehouse at two-car rail dock. As they unload car, they extend conveyor into car to minimize manual handling. Conveyor sections carry cartons by gravity 40 to 100 feet to a canvas belt conveyor, which carries them around warehouse to storage location. To make unloading easy, plant in Denver loads all luggage of same specifications together in freight car, thus eases handling of 100 different styles.

2 STORING. Belt takes over from portable unloading conveyors. Transfer is automatic. Belt is in six sections, rides in 14-in. metal pan with 3-in. siderails, runs 605 feet around three sides of 25,000-sq.-ft. storage area (whole warehouse, 50,000 square feet). Pushbuttons control each belt section's movement. Roller sections turn corners along 605-ft. path.

Outside wooden rail supports pallet boards and plywood tiesheets. Numbers on rail mark storage spots for types of luggage. Workers remove cartons, stack them up to 13 deep on pallets, which rest on stationary gravity rollers.

Warehouse With a Better Flow

Handling today will make you or break you. That's why you'll welcome a look at Schwayder Brothers' new Chicago warehouse. It slices a neat 25% off handling costs. How? With conveyors almost everywhere—nearly two miles of them.

ONLY SEVEN MEN, including a foreman, are needed to handle all incoming and outgoing shipments—up to 4000 pieces per day at peak periods. Where? At the new $500,000 warehouse of Schwayder Brothers, Inc. (Chicago), maker of Samsonite luggage. The trick? There isn't any. Just better materials handling, as you'll see when you look at the photos and drawing on these two pages—and read the captions.

The warehouse was especially designed to cut distribution costs. Indoor rail and truck docks keep all work inside. Luggage in individual cartons arrives by rail, goes out by motor truck.

Cartons containing luggage stay on conveyors from time they arrive at the warehouse until they leave. In fact, there's very little floor space in the entire building that isn't covered by conveyors of one type or

3 ORDER PICKING is done from 146 of the 153 inclined roller conveyors covering most of the storage-area floor. (Seven are inclined to outside of warehouse for return of pallets and tiesheets.) Rollers keep cartons at least 3 inches off floor, eliminate damage from water. Conveyors are 25, 50 and 80 feet long, 20 inches wide, spaced 8 to 28 inches apart.

Order pickers remove pieces from storage stacks, place them on belt. Shipping order tells what's required. Order slip on last carton in order, plus X on carton, tells checker order is completed.

4 SHIPPING. Check is made at end of 245-ft. picking conveyor (background). Orders vary from six to several hundred pieces. New stencil signals checker that a new order is starting.

At end of picking conveyor, cartons are automatically transferred to 150-ft. skatewheel gravity conveyor, hauled to indoor truck-loading dock (capacity, four trailers). Two Logan Adapto-Drive units (motor-driven rubber belts) are tied into skatewheel to shove cartons along. Skatewheel conveyor is sectionized, can be adapted quickly as loading locations change.

another. Here are the types of conveyors used in the warehouse:

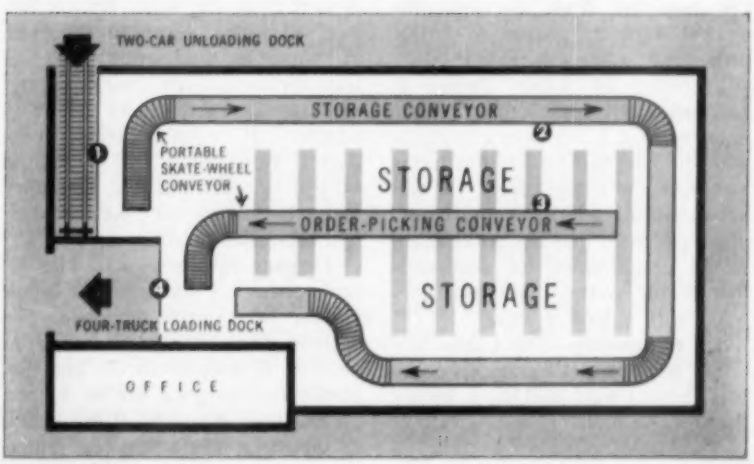
. . . *Fixed roller*—Total of 7930 linear feet.

. . . *Canvas belt,* motor-driven, constant-speed—850 linear feet.

. . . *Skatewheel* (some fixed, some portable)—300 linear feet with nine 90-degree curves.

Cost?—About $27,000 for handling equipment plus installation labor. All conveyors—except the skatewheel sections—were manufactured by the Logan Company, Louisville. Schwayder's own maintenance men installed them.

Payoff—For that small investment, Schwayder shows a 25% cut in handling cost. Plus first-in, first-out handling of inventory.



WAREHOUSE has portable skatewheels for unloading and loading (1, 4 in diagram above), runaround belt to storage (2), center belt for picking (3).

How the President Is Winning The War on Discrimination

His gamble on persuasion is paying off with gains for all. You can share in the gains if you back his fight for equal rights. Here, from the experience of plant men who've banned discrimination, is help in making integration work in your plant.

"EVERYBODY" is against sin. Nearly everybody is against discrimination. But, just as we know there are many sinners, we are equally aware that there is a great deal of discrimination in the United States."

That's a member of the Eisenhower cabinet talking bluntly to 65 of the nation's top industrialists. They met recently at Washington in a Conference on Equal Job Opportunity sponsored by the President's Committee on Government Contracts. They represented companies that handle a major share of the government's $50-billion-a-year contracts with private industry. And each of the 6-million federal contracts contains a clause that bars the employer from discriminating against minority groups in hiring, promoting, other job relationships.

Secretary of Labor James P. Mitchell was frankly telling private industry that it was not complying with the law. But he was not trying to shame the businessmen. He was not delivering a lecture. And he did not warn them that the government would crack down on companies that do not comply with their contracts with federal agencies.

Up to industry—The Labor Secretary and seven other cabinet members present were making it known that the Administration is aware of the situation. But the most significant part of the conference was that the Eisenhower team requested help and advice from industry. They had suggestions to make, but noted that the solution to the problem would have to come from within the nation's industrial plants.

This is the basic part of the government's drive to give Negroes and other groups a fair shake at jobs in industrial plants. It has been a high-priority program from the moment President Eisenhower entered the White House—a program the President turned over to Vice President Nixon to run with the help of all other cabinet officers.

It was a "we-mean-business" approach from the start. And it has paid off with a series of successes in important industries such as transportation, oil, meatpacking, and atomic energy, and within a number of manufacturing companies. But, because of the scope of the subject, and the voluntary methods used by the government, it has been slow-moving.

Tougher enforcement — The recent conference was aimed at bringing the issue out in the open. The session won't bring a change in method. It does mean the anti-discrimination program will be stepped up and may at any point reach into an industrial firm where discrimination is being practised. So it's important to know what's coming.

Here's how the program works:

. . . *Each federal contract* contains a clause that says, in part:

"In connection with the performance of work under this contract, the contractor agrees not to discriminate against any employee or applicant because of race, religion, color, or national origin. The aforesaid provision shall include, but not be limited to the following: Employment, upgrading, demotion, transfer, recruitment . . ., rates of pay . . ., and selection for training, including apprenticeship."

Notices setting forth these provisions must be conspicuously posted in all contracting plants.

. . . *The contracting agency* is responsible for policing this clause. Each agency is authorized to investigate contractors where discrimination exists and to review all companies periodically to see that they are complying. Also the agency is empowered to cancel the contract if there is a violation.

. . . *The President's Committee* on Government Contracts, headed by Nixon and made up of seven government officials and seven from industry and labor, is the anti-discrimination watchdog. It has no enforcement powers, but helps agencies review complaints, makes direct contacts with employers, and generally provides impetus for the program.

The committee is the focal point for complaints of discrimination.

By ALAN E. ADAMS
FACTORY Labor Trends Editor

Complaints come in from employees, labor unions, employers, and private social organizations. They are funneled to a special subcommittee for investigation, and turned over to the contracting agency involved.

But the committee doesn't stop there. Its members may get in touch with the company to talk over the problem and advise on how to combat it. Or the federal agency may ask the firm to change its hiring methods—at least promise to do so.

Persuasion, not force—Although both groups may pressure the firm to alter hiring or promotion policies, government groups are aware they can't always make changes quickly. They're willing to wait. In some cases they've bargained for over a year to get results. In a few others they've got a flat turndown.

Still the government has never yet used its legal powers to reach its goals. No federal agency has ever canceled a contract because discrimination exists. And there's no indication that the present Administration ever will. Instead, the idea is to persuade contractors to do voluntarily what is legally correct, and to show them how this will help company, employees, community.

Here are some of the arguments:

. . . *The nation gains* by full employment. Full use of the talents of the nation's 16-million Negroes would mean more billions in purchasing power—and more business.

. . . *Workers gain* by eliminating the disrupting forces of discrimination in the plants.

. . . *Employers gain* by getting the best man, regardless of color.

MAKING INTEGRATION WORK IN YOUR PLANT

These benefits may not mean much when an employer faces discrimination at his plant. If he tries to integrate whites and Negroes in places where segregation is in line with community social practices, he may face trouble.

The government anti-discrimination team recognizes this. But from the businessmen who have tried to wipe out bias on the job—and succeeded—it has learned that the problem is not as difficult as it seems.

Businessmen who have tried integration cite these object lessons:

. . . *Make clear* that it's company policy to eliminate discrimination.

. . . *Discuss with employees* the changes you plan, whether it's putting Negroes and whites together in the same unit, or promoting Negroes to jobs not held before.

. . . *Get support* of union leaders—if there's a union in your plant.

. . . *Make changes slowly*, on one shift at a time. If you're starting a new shift, or a new department, open it up with Negroes on the job.

. . . *Follow your personnel practices.* If workers are promoted from within the organization, upgrade a Negro already with the company rather than go outside.

Even in plants where these methods have been used and discrimination has been eliminated, there has often been trouble among employees at the start. But businessmen say trouble has been short-lived.

Often unions are as much at fault as employers. Some unions bar Negroes from membership, or insist on dual contracts separating white from Negro in working relationships or on promotion lists. But the government's emphasis must necessarily be on the employer, because he's the one who signs the federal non-discrimination clauses in his contract for government business.

Answers for skeptics—The President's Committee has faced a number of objections from businessmen who either don't like the program or are skeptical about working it out in their own company. These are typical objections and the committee's answers to them:

Objection: I'm in business. I'm no social reformer.

Answer: Businessmen have learned that integration is good business—not social reform. It uses the training, skill, and ambition of the entire labor force.

Objection: I can't move ahead of this community and its traditions.

Answer: Businessmen are leaders in their community. When they establish non-discrimination in their plants, opposition folds and expected difficulties do not arise.

Ojection: We would hire Negroes, but they don't apply for work.

Answer: If your community knows you have a fair employment policy, qualified applicants will come to you, regardless of religion or race.

Objection: Some day Negroes will be able to fill the kind of jobs we have, but not yet.

Answer: Negroes with equivalent training and skill are just as good workers as whites. Personnel records prove that under similar conditions there is no difference in turnover, absenteeism, and punctuality between Negroes and others.

Objection: I'm afraid our workers will object and walk out.

Answer: With positive leadership, many firms have adopted non-discriminatory practices and put them into effect without incident.

TOKEN COMPLIANCE WON'T DO

In past years, federal anti-discrimination emphasis has been on hiring. This is now changed. With employment currently at a high rate, Negroes are finding jobs. But they still are finding it hard to get needed training and resultant advancements up the job scale. Mitchell puts out this caution:

"It isn't enough for an employer to have 5% of his labor force made up of Negroes if they are all in the lowest level jobs."

Other pressures—Employers may face pressures from agencies other than the President's Committee. For example, 14 states have fair employment practice regulations. In 11, the regulations are enforceable; in 3, voluntary. But, like the government, these states move slowly. They've issued only a handful of cease-and-desist orders.

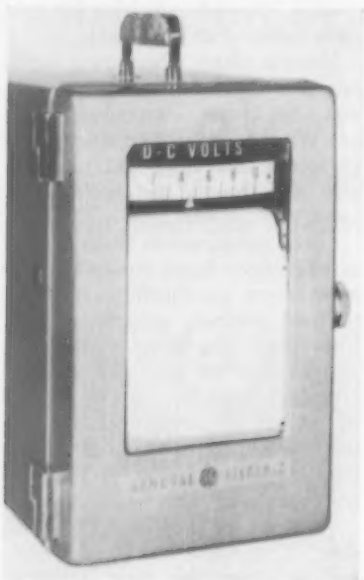
The National Labor Relations Board also is involved. Although Taft-Hartley does not authorize NLRB to punish employers and unions that discriminate, it can insist that a union has a duty to represent all members in a bargaining unit equally. In several cases it has revoked certification of a union that has discriminated against Negro members in negotiations.

But the main impetus to eliminate job discrimination still comes from the President's Committee. It is determined to wipe out discrimination. It is succeeding today through voluntary means. Its success is a tribute to its prestige in the business circles it deals with, and to its recognition of the fact that discrimination is a difficult problem that cannot be solved by edict or penalty. The end must come by education and promotion with the employer and with his community.

Coming–at the Maintenance Show

Here's a preview of typical maintenance aids you'll see. And there's still time to go (Convention Hall, Philadelphia; January 23-26). For more information circle item numbers on Reader Service Card—under "Equipment News"—next to back cover. For 35 maintenance catalogs, see page 138.

96—Portable Lift combines four carriers in one: platform truck, straddle fork truck, portable elevator, shop crane. Allows economical one-operator handling and stacking of heavy, hard-to-manage loads. 2000-lb. capacity; hand- or battery-powered. *Oster Mfg. Co.*



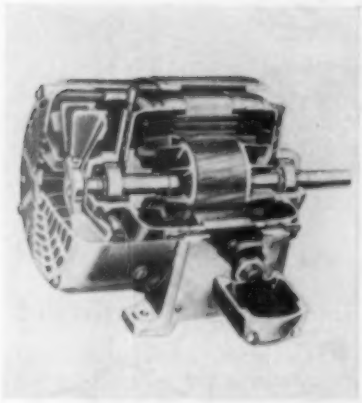
97—General-Purpose Recorder features sealed plastic throwaway inkwell, assuring clear, clean records; eliminating problems of open inkwells. Measures and records current, voltage, power, frequency, or speed. Switchboard and portable models. *General Electric Co.*

98—"Electraulic" Lifter for light duty (1000 lb. capacity) has a lifting height to 5 ft., 8 in. Lightweight, short length (29 in.), large rigid and swivel casters enable easy handling and maneuvering. Cabinet-housed power unit makes maintenance easy. *Colson Corp.*

99—Maintenance Control system employs Sched-U-Graph and Kardex equipment for 5-step management by written work orders, scheduled work, equipment records, stores control, executive reports. "Kard-Veyor" is complete file-and-post work station. *Remington Rand.*

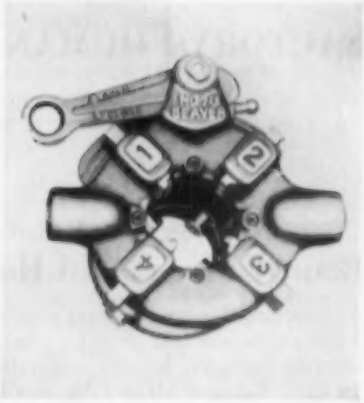
100—Safety Grating provides anti-skid surface on floors, stairs, duckboards, catwalks. "Grip-Strut" is not an expanded metal, nor a punched-out material; it's made by a slitting and folding operation. Offered in steel or aluminum. Easy to install. *Globe Co.*

101—"Chore Boy" is a maintenance and service shop on wheels. Motorized platform truck is well equipped with work bench, tool chest, vise, welding equipment, ladder, lifting jacks, other maintenance equipment. Easy to maneuver in shop and warehouse. *Allis-Chalmers Mfg. Co.*



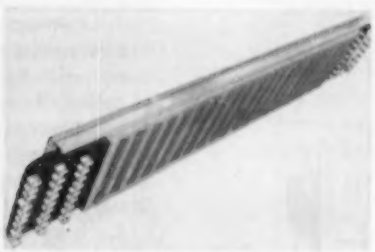
102—Chemical Motor, totally enclosed and corrosion-protected, can be used in dangerous and damaging atmospheres. Features stainless steel dust cover, high-draft ventilation, rust-resistant fittings, spark-proof bronze fan. 3-150 hp. *U. S. Electrical Motors, Inc.*

103—Stacking Shelves provide flexible storage areas. Individual shelves stack and interlock without tools or bolts; are easily arranged and rearranged. Closed-back units are made in a variety of depths and heights, widths of 37 in.; dividers available. *Stackbin Corp.*

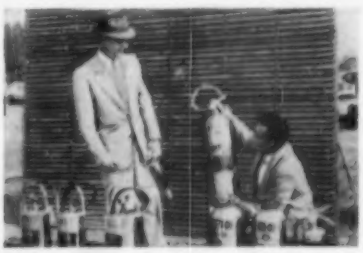


104—Pipe Threader, quick-opening quadra-type, can be used with any power drive. Model 78 threads 1-, 1¼-, 1½-, 2-in. pipe with only one set of high-speed dies. Dies may be set and reset instantly. Work aligns perfectly without clamping. *Beaver Pipe Tools, Inc.*

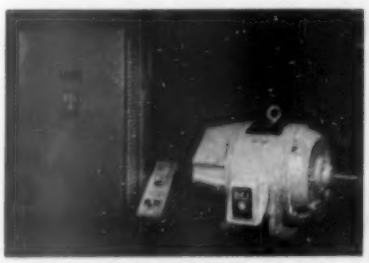
105—Floor Reinforcement protects new or old concrete floor surfaces subject to heavy loads and severe punishment. Each 11¾-in. steel plate contains 100 holes, 100 barbed prongs that anchor firmly to concrete. Easily installed without special tools. *Acme Steel Co.*



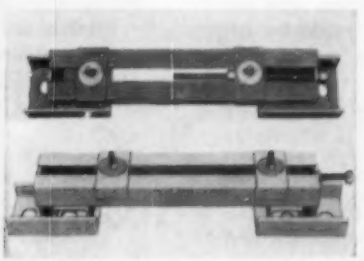
106—Current-Limiting Busway is for connection between service entrance and main switchboard, or wherever it's desired to reduce available short-circuit current. Short-circuit rating is 100,000 amp. RMS asymmetrical at load end. 1000-4000 amp. *General Electric Co.*



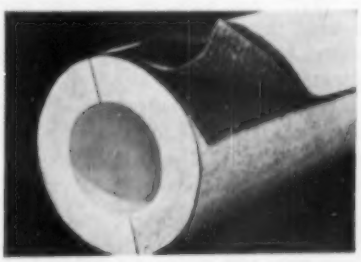
107—Fire Extinguishers are wet chemical portables in pressurized and brass containers. 2½-gal. combination water and anti-freeze pressure units; 2½- and 5-gal. pump types; 1-qt., 1½-qt., 1-gal. carbon tetrachloride and chlorobromomethane units. *Walter Kidde & Co.*



108—Electronic Drive, dubbed "Selectron," obtains infinitely variable speeds two ways: first, by manual switching; second, by automatic control from machine functions such as tension, position, linear or angular precision speed, etc. *General Dynamic Corp.*



109—Motor Isolation Base features slide mechanism that enables speedy belt tensioning, simple installation, versatile application. Same base may be used with many motors—6 standard bases accommodate 29 motor sizes. Isolates vibration and noise. *Korfund Co.*



110—Pipe Insulation is for 35- to 3000-deg. F. service in heating, plumbing, air conditioning. Made of "Fibrocel," a chemically inert silica aggregate that won't shrink, swell, rot. Economical to apply, thermally effective, permanent and sanitary. *Johns-Manville.*

FACTORY | HUMAN RELATIONS

By LESTER R. BITTEL, Industrial Management Editor, FACTORY

Benefit Plans Need Help?

An annoying thing about many employee benefit plans is that employees take them for granted. This despite advance publicity, lavishly illustrated booklets, and the like. National Metal Edge Box Company, Philadelphia, has a slick idea for packaging benefit booklets so there's a good chance they'll be retained at home—instead of discarded after a cursory reading.

Metal Edge puts the booklets in a specially designed reinforced-cardboard file box, 9x11½x1½ inches. It has a removable tray so other important employment papers—group insurance policy, etc.—can be kept in the same place. Packaging this way not only makes papers permanently available for a worker's reading and reference, but also makes a substantial impression on the rest of his family.

Giveaways That Give

Management spent $3-million last year on employee education via reading racks. Was it worth it?

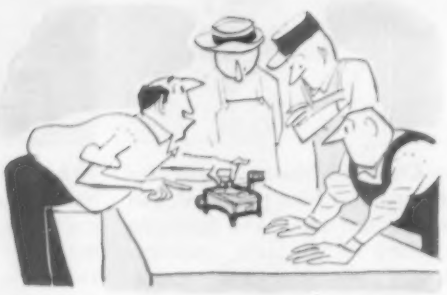
"Yes," say 83% of the 700 executives who answered this question in a survey just made by Industrial Relation News, "we feel it is money well spent."

Where do the books do the most good? Improving morale (say 23% of the respondents); improving appreciation of the free enterprise system (22%); creating confidence in management (17%).

Where were the pass-outs least effective? In dealing with specifics, such as cutting absenteeism and tardiness, and increasing production. Less than 3% of the respondents found reading-rack booklets valuable in these areas.

How do employees react to the program generally? Over 70% of the companies queried felt that employees responded favorably to the reading-rack.

If you'd like to know more about the data uncovered by this survey, copies of the summary are available for $55 from IRN at 230 W. 41st St., New York.



This Training Should Take

Technical training your problem? Then we suggest you look further into two new training aids.

1. American Society of Tool Engineers is developing a series of program kits to aid technical presentations made by your qualified instructors. First kit is called "Forces in Single Point Tool Metal Cutting." Discusses purpose of various tool angles, chip types, cutting variables, hardness as a measure of machinability. It's useful for teaching machine operators as well as tool designers.

Each kit contains (1) a speaker's manuscript, (2) visual aids (slides), (3) up to 25 free copies of program for distribution. Takes about 45 minutes to present. To borrow, write National Program Committee, ASTE, 10700 Puritan Ave., Detroit 38.

2. Miniatecnic, 15 Auf der Mauer, Zurich 1, Switzerland, makes kinematic models of mechanisms for use in training mechanics, apprentices, designers. A few of the 50 models now available: crank and rocker, four-bar linkage, Watt's planetary gear, curved cross-slider crank, Maltese cross mechanism, indexing angle 60 or 90 degrees.

Models are machined to close tolerances out of metal, measure approximately 6 inches square. They are sold in four sets of 12 or 13 models each. Sets cost about $100. Buy with UNESCO coupons.

New Magazine for Foremen

Into the crowded field of supervisory information services comes another publication. This one is called *Supervisory Management,* a fat little monthly magazine produced by the editorial staff of American Management Association. First issue looks serious, helpful, and professional. If you have a program for furnishing supervisors with supplementary training material, you'll want to consider this publication. Subscription: $7.50 a year for non-members.

Factory Execs Get Culture

Don't be startled if you see one of your plant operating friends studying a painting in the Chicago Art Museum, or attending a reading of Robert Browning's poems. He's probably following the advice of Earl G. Planty's thesis for industrial executives: If you'd improve your understanding of yourself and others, then learn to enjoy poetry, drama, music, and the fine arts!

Since Earl is the fellow who wrote the book, (*Developing Management Ability, Ronald Press*), and who made a national reputation as Johnson & Johnson's executive counselor, we're taking him seriously.

Planty, now a professor at the University of Illinois' College of Commerce and Business Administration, warns that industrial managers tend to over-concentrate their interest in the special area of their own experience. He advises:

"A man who has learned to enjoy a poem or a play is more relaxed at his leisure and more alert on the job." So bring on your William Shakespeare!

Pin Down Those Gripes!

The Wall Street Journal reports this unusual plant communication device. At the exit to its service rooms, this company installs a speaker connected to a tape recorder. Workers can make complaints without being identified. Recorded gripes are then subjects of discussion at union-management meetings.

There's no evidence of the real usefulness of this method. And many unions might consider it a bypass of grievance channels. But it could be helpful a sort of daily attitude survey.

Overtime for Charity

If your plant has to work a number of days overtime each year, here's a way to boost employee contributions to your Red Feather campaign:

The Chicago Screw Company, Bellwood, Ill., sets aside one overtime day each year as D (Drive)-Day. Union and management urge workers to earmark a big chunk of this extra income for charity. Last year it amounted to about $10,000 from 1600 employees.

The union local (UAW-CIO), twice winner of the Philip Murray award for participation in civic affairs, does its share, too. It puts up a 21-in. TV set, other appliances, for a drawing held for workers who pledge 50% of the extra workday wages.

We won't advise management to make work—especially at time-and-a-half rates. But if the extra time is in the books, this is a realistic way of helping workers to share community responsibilities.

Safe-at-Home Contest

Subject of Grumman Aircraft Engineering Corp.'s (Bethpage, N. Y.) monthly safety-letter contest this month is, "What I have done to prevent accidents in my home." It's another indicator of the trend to link safety in the plant with safety off the job.

Let Workers Pick Site

Ever give a thought to letting employees pick the location of your new plant? Sound unscientific, or a little like giving away management rights? Not the way Pullman Vacuum Cleaner Corp., Boston, did it.

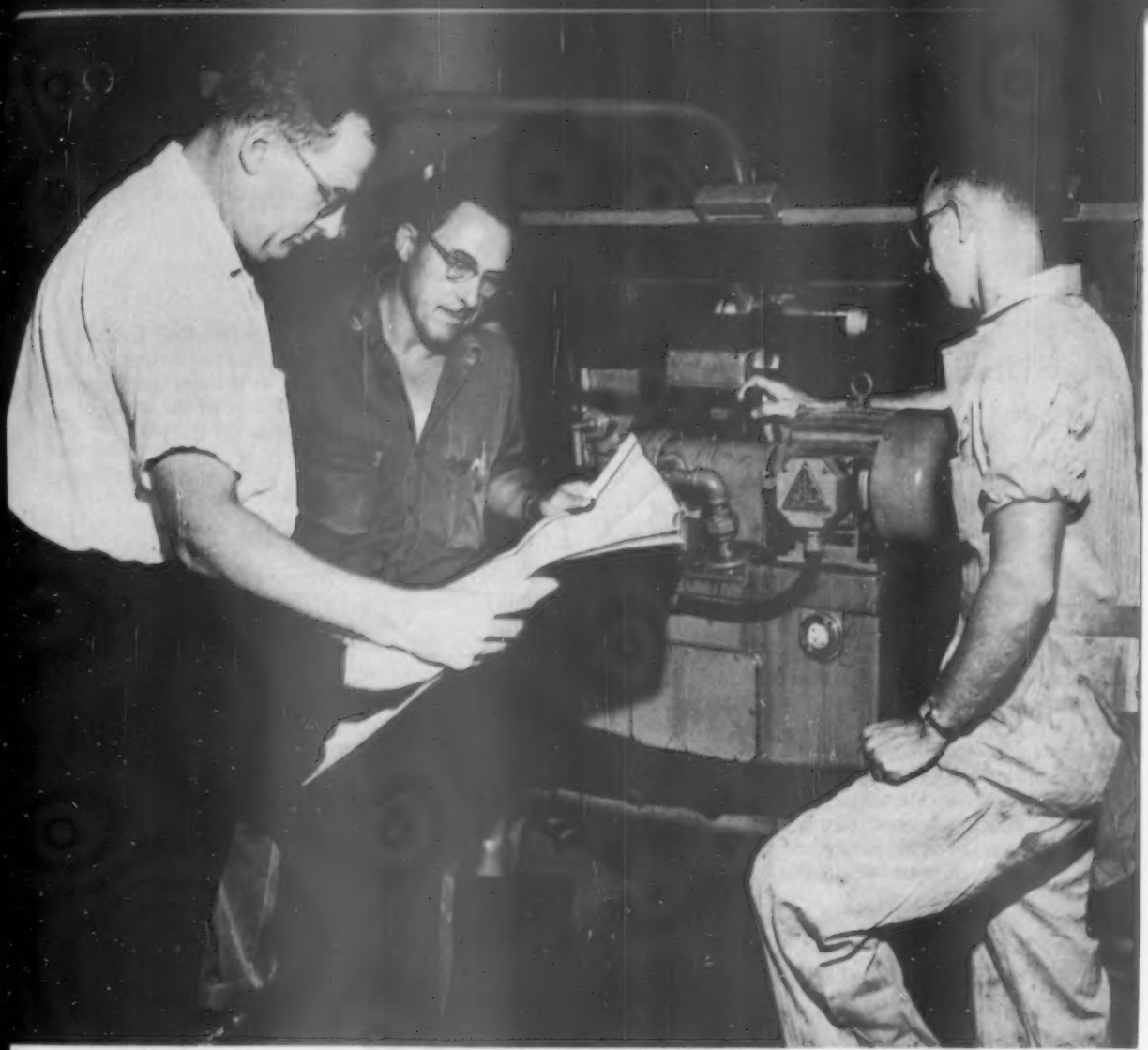
First a management committee screened 25 possible locations, narrowed the selection down to three likely spots. Next they presented facts on transportation and other worker-centered considerations to an employee mass meeting. Then employees themselves made final decision by secret ballot.

To us this looks like genuine participation—and on a workable basis.

Lottery Forces Delegation

Here's a management development idea that we can't pin down to the source. But it's worth repeating. This southern company puts the names of all its first-line supervisors and middle management people in a goldfish bowl. Once a month the general manager pulls a name out of the bowl. The "lucky" winner gets a two-weeks' vacation. Catch? He's got to leave the plant as soon as the drawing is over.

Idea is to encourage supervisors to develop subordinates who can act effectively in their absence. And since no one likes to leave a shop condition that can be criticized in his absence, the program puts pressure on supervisors to keep the shop in order and records up to date.



First the facts... Hydraulic serviceman (center) works by Oldsmobile law. That is, study the circuit diagram carefully and learn how the system works before you touch a tool to the job.

Trouble-Free Hydraulic Service...

...is possible—with a maintenance prescription like Oldsmobile's. It pays off in fewer emergency repairs, less production downtime, longer equipment life.

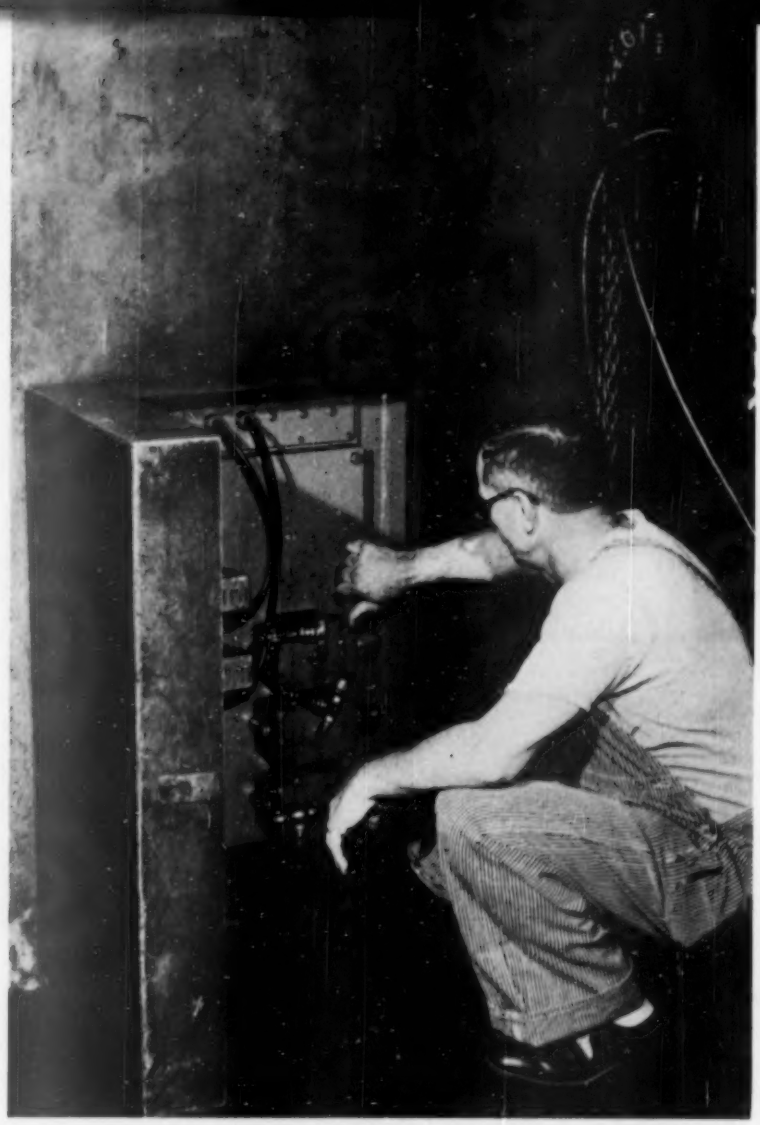
IF YOU WAIT for a breakdown of hydraulic equipment to tip you off that it needs service, it's too late. That's an Oldsmobile credo.

At Oldsmobile we can't afford hydraulic breakdowns. About 80% of our production machine tools depend on hydraulic circuits. Downtime is too expensive. And repairs always cost more than adjustments.

But we go even further. We aim to catch and stop trouble in the making. This poses an even bigger problem. Why? Because it's easier to locate a broken or unevenly worn part than to find a part that's worn only a thousandth of an inch. Or a part that's distorted by drawing down too tight on a bolt (which will freeze a spool in a bore).

We know that a defective hydraulic component usually can keep running a long time before it cracks up.

By E. R. LERCZAK,
Hydraulics Engineer, Oldsmobile Division of GMC, Lansing, Mich.



...then the repair

Keeping covers tight on oil reservoirs is one of the simplest ways to keep hydraulic oil clean.

But it will not operate efficiently. This is our cue to give it attention. Our signals? Noise, for example. Many times abnormal noise points to trouble, even though on the exterior the cycle is operating acceptably. We have learned to recognize and act upon such danger signals.

Prevention pays—We've found a preventive maintenance program solves a lot of our hydraulic maintenance problems. And promises longer life for equipment.

In our program the object is to have fewer men on repairs, more men checking equipment. Eventually we hope to eliminate almost all emergency repairs. No emergencies will mean little or no production downtime, which is our chief goal.

At present we spend most of our hydraulic - equipment maintenance time on major repairs. The remainder of the time goes for inspections, adjustments, minor repairs, and diagnoses of need for major repairs to avoid breakdowns. Our men have been trained to use the necessary instruments and tools to check performance of hydraulic circuits.

We also study all downtime records. They guide us in setting up inspection schedules. And the history developed from these records will help us appraise equipment and components, make service comparisons, eliminate inferior equipment.

"Stop leaks"—Nearly everyone agrees leaks are the No. 1 headache. Only way to meet this, we feel, is to educate everybody that leaks can be very expensive. And concentrate on eliminating all oil leaks, no matter how small.

We found Oldsmobile was consuming hundreds of barrels of oil per month. Some 90% was going for leakage replacement and oil changes. Moreover, costs of storing and handling this amount exceeded our basic material costs.

Oil leakage carries other indirect penalties. For instance: accident hazards, greater housekeeping costs, fire hazards, cost of floor-drying adsorbents, contamination of cutting oils and fluids by hydraulic oil dripping into pits. We also have a suspicion that there is a correlation between leakage and downtime. But we have no facts to substantiate this.

Oldsmobile considers all leaks bad. A leak of 7 cubic inches per hour from one connection doesn't seem much. But it equals three bottles of ink. Lots of plants consider a leak of ½ gallon per connection per day of small consequence. But in a simple circuit of 3 directional control valves and 30 connections operating 16 hours a day, this means over 100 gallons a week lost in leakage.

Causes and cures—Biggest source of leaks at Oldsmobile is from piston-rod packings and seals. We're attacking this problem two ways. First, we now check all specifications for new equipment to make sure we install only acceptable types. Experience has taught us what's good—and what's not so good. Second, we watch for leaks in our preventive maintenance routine, make adjustments or replacements promptly.

Next biggest source of leaks is loose connections, or leaking pipe threads. Here also specifications are drawn to cover only acceptable types of fittings. And again preventive maintenance routine calls for prompt action on all leaks.

Third biggest source of leaks is broken lines. They require emergency repairs. We are hoping to minimize this trouble by including in our specifications for tubing the maximum hardness and required wall thickness.

"Keep oil clean"—We have learned that nothing will wear out

TROUBLE-FREE HYDRAULIC SERVICE . . . *Begins on page 110*

hydraulic equipment more quickly than dirty or diluted oil. Dust from cast-iron operations is the worst threat. Sometimes coolant gets in. The end result is extended downtime for cleaning and repairs.

All sorts of trouble can happen. Many burned-out solenoids result from inability of the armature to complete a stroke because deposits block a spool. Sometimes intake screens in reservoirs will clog, causing pumps to cavitate. Deposits of oxidized oil near valve seats cause circuits to malfunction and cycles to slow up.

At Oldsmobile we prescribe these methods to keep oil clean:

. . . *Screens* on all breathers and filler holes of reservoirs.

. . . *Scrapers* on all piston rods.

. . . *Steel-wool screens* on vented manifolds for drain lines.

. . . *Separate oil filtering circuit* with its own motor.

. . . *Tight-fitting covers* on all oil reservoirs.

. . . *Discard* open containers or reservoirs wherever possible.

In addition to these mechanical improvements, we make sure the oil is clean when we add it to a system. The servicemen tighten the bolts on covers, and stay on the prowl for loose covers all the time. There's no relaxing in this simple duty, because it's so important.

Trouble-shooting—When trouble does occur in a hydraulic circuit, Oldsmobile wants it fixed fast. Fastest and biggest help in diagnosing cause of failure—and hence type of repair—is our five-step "Line of Action" guide. Oldsmobile teaches this to all servicemen in the training course described in the previous article (FACTORY, December 1955, p. 108).

We vouch for its effectiveness. In fact, if a man doesn't find the trouble, or fumbles on a repair, it's usually because he skipped a step in the guide.

Here's our five-step guide to better hydraulic maintenance:

1. Determine the cycle of the equipment from the diagram or machine operator, thus find out how it should work.

2. Determine the action of the component parts of the hydraulic circuit from diagram and catalog of the equipment maker, thus find out how each part sequences and triggers the next move.

3. Determine—by actual inspection—the particular element of the cycle at which the trouble occurred. Real diagnosis begins here. It's the way to find out where trouble really started.

4. Determine—by actual inspection—the action of the component parts of the element, thus find what parts are responsible for lack of movement or wrong movement.

5. Examine all components that are subject to wear or distortion. This will uncover cause of failure, permit prompt and proper repair.

This is the second of two significant articles on maintenance of hydraulic equipment. You'll find the first in December FACTORY, p. 108.

10 DO'S AND 10 DON'T'S... FOR HYDRAULIC SERVICEMEN

DO first use the hydraulic circuit diagram to study the cycle of the equipment.	**DON'T** do anything until you master the cycle.
DO use the manufacturer's literature to study the components. The general foreman maintains a complete file.	**DON'T** adjust a component until you fully understand its construction and operation.
DO get the operator's version of the machine's action to help you locate and correct the defective component.	**DON'T** attempt any adjustment until you review a description of the defective cycle.
DO use a gage to compare adjustments of machine pressures with those recommended on the hydraulic diagram.	**DON'T** adjust a pressure control without a gage in the line to tell you what pressure is being developed.
DO use a three-cornered scraper to knock off the interfering high spots. This does not increase the clearance between the spool and bore on reassembly.	**DON'T** lap the bore of a valve that has been in operation with a lapping bar. This makes the bore egg-shaped and leaves lapping compound in the valve.
DO use a prick punch to mark mating parts during disassembly. Punch as far from edges as possible.	**DON'T** mark the parts of components by mating chisel marks. This deforms the parts, makes them unusable.
DO use clean, lint-free wipers. Clean the parts in kerosene or some other non-toxic solvent.	**DON'T** wipe off parts of components with dirty rags or shop towels.
DO lubricate parts prior to assembly with clean hydraulic fluid as used in the circuit.	**DON'T** assemble parts of a component without using a lubricant, lest you score them.
DO draw up all screws and bolts evenly and tight enough to prevent leakage or later loosening from vibration.	**DON'T** tighten anything too tight. If you do, you'll distort it, create a need for still further servicing.
DO adopt a logical plan to correct the trouble. If there are several possible defects, examine and correct the easiest one first.	**DON'T** replace a component just to try out an idea as to the cause of the trouble.

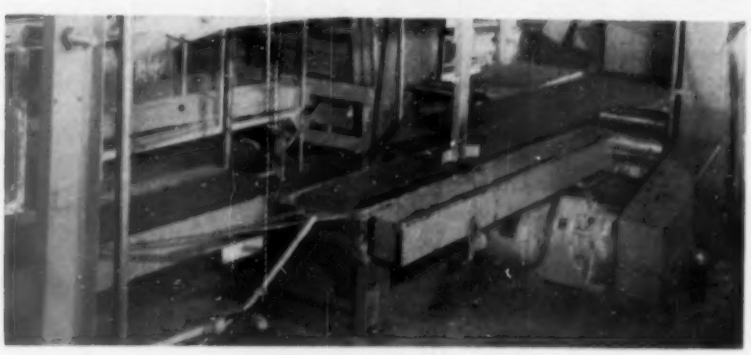
Newest Way to Cartonize

With this hot-off-the-drawing-board equipment, packing (once the carton is dropped into place) is a no-hands operation all the way to the warehouse.

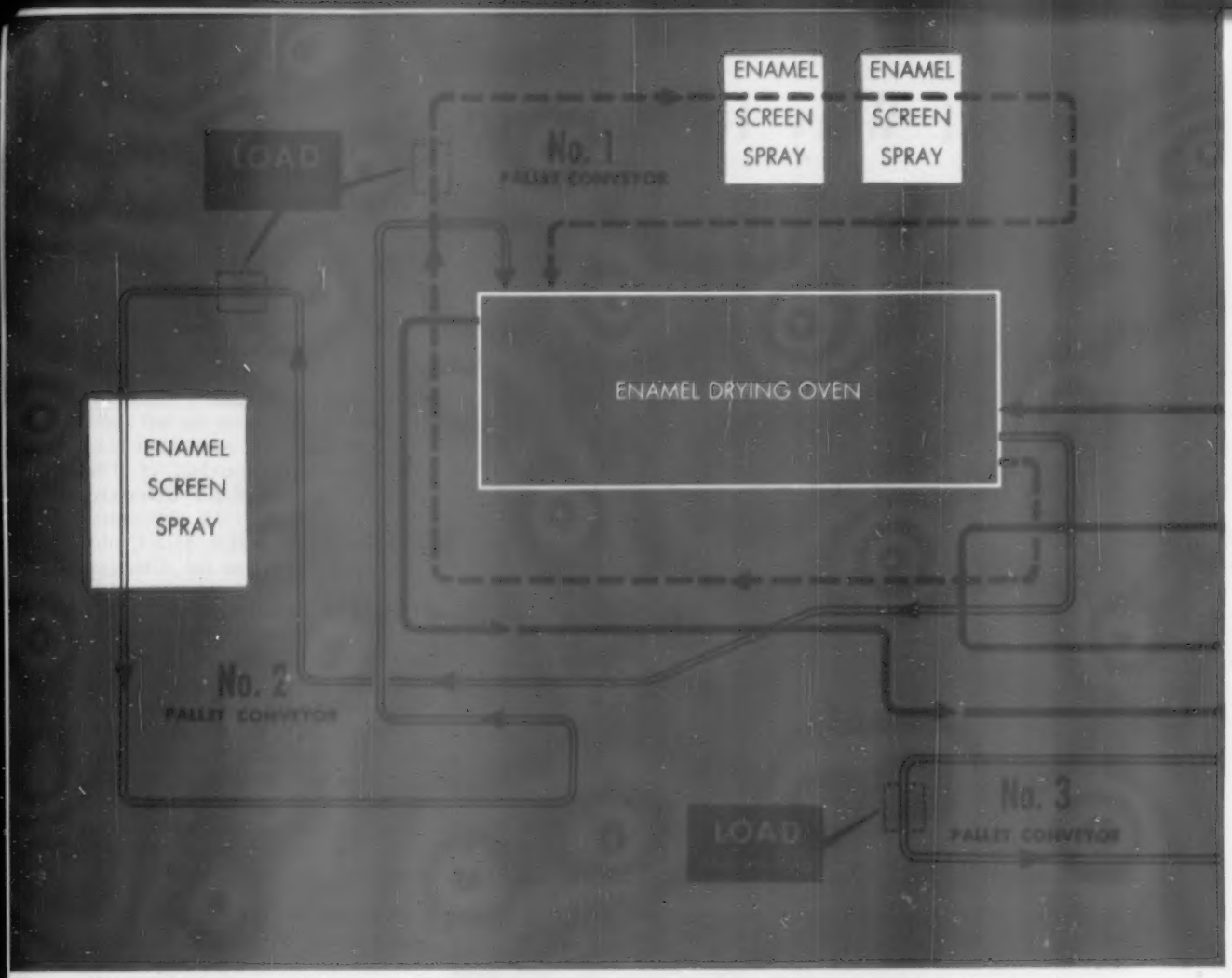
IT'S A CINCH to close the top flaps of a carton automatically. But closing and sealing bottom flaps has always been an industrial engineer's nightmare. Photos on the left show the operation of a new solution to the problem—a product of The Hinde & Dauch Paper Company, Sandusky, Ohio. First two users: Whirlpool Corporation, at its Clyde, Ohio, plant; Hotpoint Inc., Chicago.

◀ **PROCESS BEGINS** when washer, mounted on corrugated base, arrives at this point. Packers square up carton, fold up two side flaps as shown, drop carton over washer. Washer is supported (see center photo for details) by two pivoted widths of roller conveyor and two side plates. The side plates are retractable. They alone support the load when, in the next step, the operator at the right steps on a pedal, causing . . .

◀ **NARROW WIDTHS** of conveyor to pivot down. This allows carton to fall further down over the washer, until the folded-up side flaps are resting on the side plates (which, you'll remember, are supporting the load, at this point). Another push on the pedal and the hinged conveyor sections pivot back up, folding the two end flaps up under the washer. The side plates retract, and the unit is ready to move on down the conveyor, with the two end flaps already folded under and the two side flaps folded out (as in top photo).



◀ **LAST TWO STEPS** are shown here. Carton (far right) is about to reach powered-belt section of conveyor. First, glue is applied to side flaps by rollers on both sides of conveyor. Then carton, held upright by horizontal guide bars, moves through flap-closing section. Note that conveyor is "cut away" first on one side, then on other. As carton passes over these sections, it is moved forward by belt on one side, while an arm on the other (unsupported) side closes flap on that side.



IN, THROUGH, OUT, BACK—These four conveyors weave a money-saving pattern in a big paint shop.

No Time Out for Handling

Not for spray painters at Stewart-Warner. Not since S-W conveyorized its painting operations. Net result—11 men are now doing what used to take 25.

BETTER HANDLING methods in its spray-paint department really pay off for Stewart-Warner Corporation, Chicago. When modernizing this operation, the company streamlined the movement of parts within the department, as well as the handling of paints.

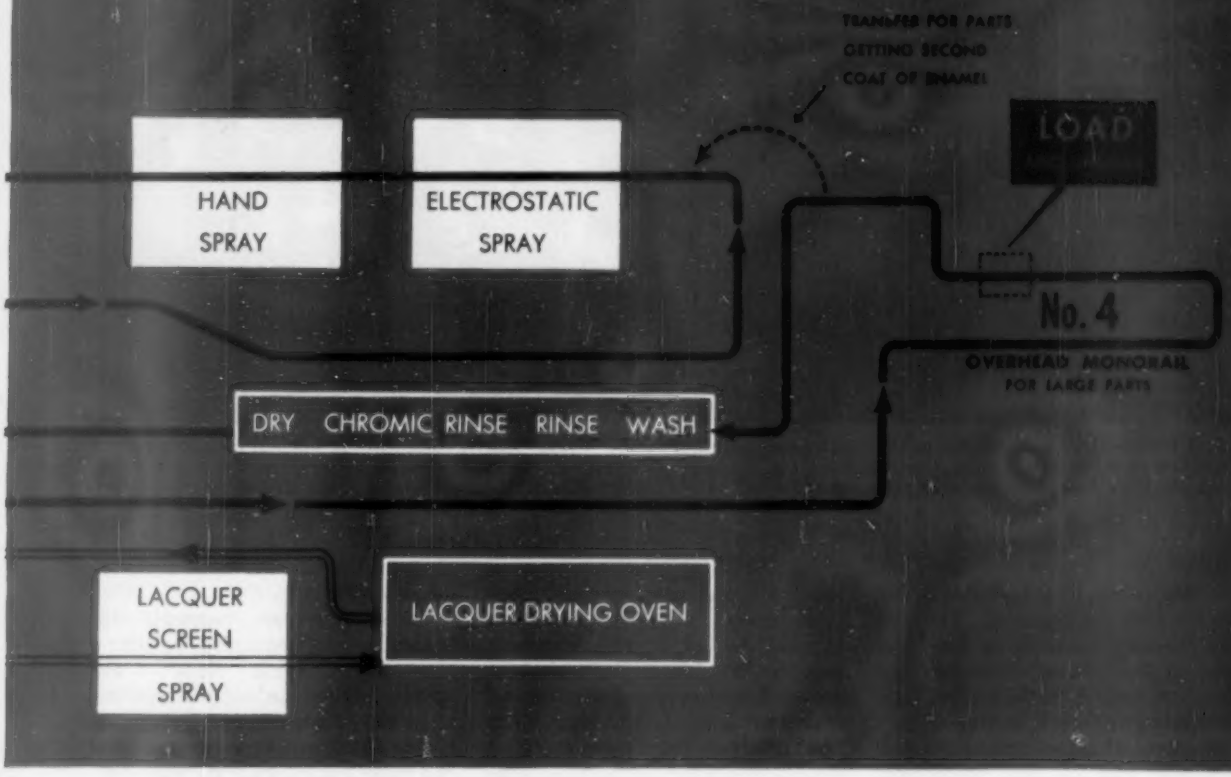
For transporting parts, four separate conveyors are installed (see diagram above). Three of them—two pallet-type and one overhead monorail—carry parts through enameling operations. Each conveyor is individually powered, has its own spray booths. But all three follow the same path, at different levels, through one gas-fired finishing oven. Fourth conveyor—also pallet-type—handles only lacquer work. This line has its own spray booth as well as a separate drying oven. All conveyors were made by Conveyor Systems, Inc., and were installed by Spra Con Company, both of Chicago.

Since installing this new equipment a year ago, work volume in the department has remained the same. But it's now handled with:

. . . *Fewer people.* Number of sprayers dropped from 23 to 6. Only increase (from 2 to 5) was in service workers—mostly to load and unload conveyors.

. . . *Less congestion.* Although

How Stewart-Warner Conveyorized Washing, Spraying, and Drying Operations



the department occupies the same floor space (about 18,000 square feet), overcrowding and disorder have been eliminated. Probably the prime contributing factor here is removal of about 70 large hand trucks from the scene. Formerly these trucks transported parts around the department. Now only six of them are used for handling special jobs.

. . . Better safety. The new paint circulating system is responsible for this. Paints now come directly to spray booths from a central paint mix room. There are no pressure pots or gravity buckets to be filled at the booths.

OLD SET-UP

To understand better how Stewart-Warner got such a substantial man-power reduction (from a total of 25 to 11 workers) take a brief look at the old paint-spray operation. It was a congested system. The sprayers did their own handling —including mixing paints as well as moving parts.

Generally, here's how the old system worked:

Handlers delivered pallet loads of unpainted parts to the spray booths. Here the sprayer removed the parts individually from the pallet and positioned them on a painting screen that rested on a manually rotated pedestal in the spray booth. Next he sprayed the parts (see left photo, next page), then moved them, with the screen acting as a pallet, to a multi-tiered hand truck. When each truck was fully loaded, the sprayer put it in a box oven to bake for about an hour. When baking and cooling processes were completed, he pushed the parts to the packing area.

Thus the sprayer took care of all handling from the time parts were delivered to the paint booth until they reached the packing area. This way, he spent over half his time just handling parts.

NEW CONVEYOR SET-UP

Best way to understand how Stewart-Warner's new conveyors work is to break their operations down into sections:

. . . Two pallet conveyors for small enamel work (Nos. 1 and 2).

. . . A pallet conveyor for lacquer work (No. 3).

. . . Overhead monorail conveyor for large enamel work (No. 4).

The path of each of these conveyors forms a loop. After being

OLD WAY—Spray painters used to work with large, awkward hand trucks and palletized loads. Congestion in booths was bad. Sprayers spent a lot of time moving parts around.

NEW WAY—Sprayer coats parts as they rest on screen pallets carried by 4-wheel trolley-like carriers. Screen rotates as it passes through booth, lets spray reach all sides.

loaded, parts stay on a conveyor until they return to the starting point, where they are removed. They are not handled manually at any time during their travel. This lets one worker handle both loading and unloading for each conveyor loop. The route of each conveyor, including rises and dips, can be followed on the floor-plan drawing at the start of this article.

Overhead monorail—Parts hang on individual hooks on this constant-speed, motor-driven, 654-ft. long conveyor. The parts, carried at 18-in. intervals, are larger in size than those carried by the two pallet conveyors that also serve the enameling operation.

After leaving the loading area, parts travel at 8 fpm. through a 78-ft. long power spray washer. Here spray jets wash, rinse, acid treat, and dry all parts as they move along on the conveyor.

(Smaller parts for the three pallet conveyors—two for enamel and one for lacquer—also go through this same cleaning machine. A 36-in. wide wire mesh conveyor belt carries them from one end to the other. The speed of this unit can be varied from 3 to 9 fpm. From here these parts are then transported on wooden pallets to the other conveyor loading stations.)

After washing, parts on the overhead conveyor double back, then pass through two 10-ft. paint spray booths. As the drawing (previous page) shows, one spray booth is an automatically operated electrostatic spray; the other, a hand spray. The hand spray is mostly for touch-up jobs on which the electrostatic spray cannot be used.

The overhead conveyor next carries the painted parts into the baking oven. (As mentioned earlier, all three conveyors that carry enameled parts travel through the same baking oven—but at different levels.) Traveling at 8 fpm., it takes each part about 21 minutes to wind its way through the 310 F. oven. On leaving the oven, parts cool off as they return to the unloading area on the conveyor. Here they are unloaded and put on pallets for delivery to assembly departments or the shipping area.

If a part needs a second coat of enamel—as some do—it remains on the conveyor and starts around the loop a second time. But just before it reaches the cleaning machine, it's transferred by hand so that it short-circuits the cleaning operation. (The transfer point is marked on the drawing.) Thus it passes directly to the enamel spray booths, then follows a normal route on the overhead conveyor back to the unloading area.

Pallet conveyors (enamel)—In preparation for enameling, an operator places small parts — already spray-washed—on 20x20-in. screens. These screens support parts during their travel on one of the two pallet conveyors that handle the enameling. With parts in place, screens are next positioned on conveyor's four-wheel trolley carriers. Each carrier moves on four 2-in. skate wheels. Because they handle same parts and same painting operations, these two conveyors have a common loading and unloading area. But two lines are needed because of the volume of small parts.

Both conveyors travel at 12 fpm. They have a 36-in. interval between skate-like pallet supports and are approximately the same length (348 and 363 feet respectively). As the layout shows, each has its own DeVilbiss water-wash paint spray facilities. One line has two 6-ft. booths (for one sprayer each). Other line has one 12-ft. booth (for one or two sprayers). When two sprayers work on either line, each enamels parts on every other pallet. As the pallets pass through the booths at about waist level (photo above, right), they are automatically rotated by making the pulley directly

under the screen pallet ride a stationary belt. In the spray booths, the chain and skates of the conveyor pass through an angle-iron tunnel to protect them from the paint spraying operation.

Each booth has five hand spray guns, each handling a different type or color of paint. In addition to the booths along the conveyor routes, the department also has two extra booths for spraying jobs that are specially masked.

Each of these two pallet conveyors follows its own path until it reaches the baking oven. They enter oven together at different levels. Then trace same path as overhead conveyors—but in opposite direction. It takes about 15 minutes for a pallet of parts to pass through this oven. Upon emerging, parts are carried back to the unloading area. Here they are transferred to wooden pallets for removal to subsequent operations.

Pallet conveyor (lacquer)—Lacquering is separated from enameling because each requires a different baking temeperature. After cleaning, this 138-ft. pallet conveyor carries parts requiring lacquer through each step of the operation. Procedure is much the same as that used with pallet conveyors for enameling. An operator places screens carrying washed parts on the conveyor. Conveyor takes them directly to a lacquer spray booth. Next, at a speed of 12 fpm., they travel through a U-type baking oven operating at 150 F. It takes about 3½ minutes for parts to pass through this oven. Finally, they return to unloading area, where they're removed from conveyor for movement out of the department.

PAINT CIRCULATING SYSTEM

All paints used in the department are pumped directly to the spray booths from 55-gal. drums in the paint mix room. To prevent clogging, paints are continually recirculated under 15 to 20 pounds of pressure in the 1-in. seamless steel tubing used for distribution.

A two-barrel supply of each paint is always on hand—one in use, the other in reserve. Nine different paints and thinners are handled in this way. These include four lacquers, two primers, two synthetics, and a thinner.

NO LOST TIME at this door. Radio signal from truck lifts it, then closes it after truck has passed through.

Now—Non-Stop Trucking...

... with radio-controlled doors. Here's open-and-shut proof that faster handling pays off in lots of ways.

"MIGHTY HANDY!" That's how Allis-Chalmers Manufacturing Company feels about two radio-controlled doors at the West Allis (Wis.) tractor plant. One is in a manufacturing building, the other in a warehouse.

Reason for radio control: To speed fork-lift truck traffic between shop and storeroom. Almost all materials carried from storage to shop pass through these 10x10-ft. doors. Elsewhere traffic doesn't warrant radio control.

Benefits—At A-C, the magic doors have brought about . . .

. . . *Faster movement of materials.* No stops to open, close doors.

. . . *Better use of trucks.* No in-transit idleness.

. . . *Less operator fatigue.* Moving heavy doors by hand isn't easy.

. . . *Better working conditions.* Workers are less exposed to blasts of winter cold and summer heat.

How the system works—Two trucks serving shop and warehouse have small radio transmitters. Transmitters operate on the truck's 6-volt line, have a range of 75 to 100 feet. Approaching closed door, operator presses dashboard button to energize transmitter. Receiver at door picks up signal. (The two doors are 300 feet apart. Only one receiver is within range at one time.) Receiver closes a relay. Relay in turn starts 1/3-hp. motor that raises door. When truck is through doorway, operator sends second signal to close door.

Any hitches—Suppose somebody is beneath door. Nothing happens. Because door has safety device along bottom—a rubber hose with one end sealed, other end connected to pressure switch. If hose contacts an object, compression trips switch, stops door. After emergency stop, door must be raised to top before it can be lowered. Two re-set buttons (one on inside wall, another outside) are provided to raise door to top. Same pushbuttons operate doors semi - automatically when trucks are not close by.

Cost?—When installed (by Crawford Door Company), radio and controls cost about $1000, including labor but not doors. (They'd cost about 15% more today.) Maintenance has been negligible—transmitter adjustment about three times a year, occasional tube replacement.

Tops in Electrical Maintenance . . .

. . . with only a 3-man crew for the whole complex plant. Secret: engineered maintenance, no paperwork for electricians. Payoff: top work at rockbottom cost.

JUST THREE electricians — each one a journeyman up from the ranks. But they do all the electrical work in a plant with some 500 motors, 300 production machines that use electrical equipment, over 50 complex test facilities, as well as a variety of other equipment including transformers, substations, power and lighting panels, and plant service equipment.

Where? At the 83,000-sq.-ft., 400-employee plant of the Aeronautical Division, Robertshaw-Fulton Controls Company, Anaheim, Calif. And there's no direct, full-time electrical supervisor here, either. The whole 18-man maintenance department (including electricians) has only one supervisor.

Secret of so much electrical work from so few electricians: *They do nothing but electrical work.* Other workers schedule, design, dispatch, keep records, do all other non-electrical jobs.

With this system the electrician doesn't waste any time. Everything is done for him. Nothing is left to his discretion. That's why R-F doesn't need a lot of highly skilled electricians. What's more, says C. A. Gallaher, plant engineer, the company gets better work—and less costly work—even with journeymen.

This is no ordinary plant. It's packed with complex devices—from electronic control, inspection, and vibration equipment to electronically controlled metal-working lathes. Tolerances are exacting—to 0.0002 inch on mass-produced parts. Test results (derived in air-conditioned rooms) must be accurate to five decimal places.

R-F's three electrical men keep busy with many jobs. For example:

. . . *Routine maintenance* of the electrical distribution system as well as electrical and electronic production and test equipment.

. . . *Preventive maintenance,* including inspection and repair.

AT TEST BENCH—One of Robertshaw-Fulton's three electricians checks panel cord on a test instrument that was built and is maintained right in the shop.

. . . *Building and calibrating* a variety of test sets and panels

. . . *Maintenance and cleaning* of lighting fixtures.

. . . *New construction work* on the electrical plant.

With this stripped-down crew, how does R-F get electrical maintenance work done? Here's the pitch:

No changes—No deviation from plans is permitted without approval of the project engineer. "If the engineer has done his job well," says Gallaher, "he put a lot of thought into the design and had good reason for everything." Even so, mistakes can happen. If the supervisor or the electrician is convinced the design just won't work, he takes it to the engineer. The engineer will make whatever changes are considered necessary.

Freeing the maintenance department from responsibility for design enables the company to get along with only one maintenance supervisor—rather than individual supervisors for general, mechanical, and electrical crafts.

NEW WORK

Electrical projects are set up completely—scheduled and estimated—in plant engineering. Every job plan lists all component parts, includes a complete set of wiring diagrams. The project engineer sets starting date and duration, sends parts list to dispatcher. Dispatcher gets everything ready for the electrician—requisitions all parts, handles all parts, handles all scheduling. When he has all components in hand, he notifies the project engineer. The project engineer runs a check to see everything needed is in hand, then okays a job ticket made out by the dispatcher. Ticket is made out in days or hours—or whatever terms are needed to coordinate all crafts. Then project is ready for production control board, where maintenance supervisor can check his schedule, synchronize the work of the different crafts.

The job ticket is a three-copy affair. White copy stays on the board. Yellow copy and hard copy

go with the worker. When the job is done, the project engineer who asked for the job signs the ticket, keeps the yellow for his department. (If the job is old work, the production supervisor signs the ticket, keeps the yellow.) The hard copy and the white copy go to Plant Engineer Gallaher, who then sends the white copy to accounting, keeps the hard for later reference.

How are costs estimated beforehand? Accounting and project engineer (who report to Gallaher) do it. Engineering tells accounting what parts and how much time are needed. Accounting does the figuring, saves maintenance the pencil work.

PREVENTIVE MAINTENANCE

It's streamlined also, administered solely by the dispatcher, who dispatches all maintenance work. R-F uses two scheduling systems: (1) production control board for recurrent jobs to be done on a specific day; and (2) file card system for jobs scheduled over longer periods, which also wind up on the board.

Job ticket? Same as for new work—with space for number, date, time of start and finish, description of work, machine and account number, signatures. Handled like the job ticket for new work.

Here's how preventive maintenance works: For recurrent jobs and file-card jobs, inspections are flagged. Both are posted on the board to indicate inspection due. On due date, the dispatcher makes out a job ticket for inspection (it's used also for work to be done), attaches a checklist for machine or facility to be inspected. (Checklists, for complex equipment only, are filed with general foreman, dispatcher, quality control, and the appropriate government department if Uncle Sam is the customer.)

Electrician does whatever work needs doing, notes work on job ticket, states condition of equipment before inspection (if it's critical equipment) and after work has been done. Production supervisor approves work done. If job can't be done on the spot, fact is noted on checklist and work is re-scheduled by supervisor. Job tickets and inspection checklists are filed for reference and for accumulation of repair and cost data. Accounting keeps track of expenditures.

ROUTINE MAINTENANCE

It's scheduled on cards by periods, not by the day. Except for air compressors and similar equipment, which must be scheduled by the day—usually on Saturdays — to avoid interfering with production.

Routine maintenance items are put on cards, which are held for 30, 60, or 90 days. With advice of production foreman, maintenance supervisor issues job tickets for any time within period, giving leeway of 30 days or more to take care of any one machine. This way, electrical maintenance is done at convenience of production. When jobs are done, cards are transferred to "completed" file. If at end of period some cards are left in original file, maintenance workers go on premium time to finish them.

How are these jobs estimated? Same as for new work.

A sharp eye on machines? Sure. When any one piece of equipment begins to give trouble repeatedly, Gallaher starts keeping track of time and expense, watches developments carefully. But only if it's repeated trouble. Gallaher feels red tape and paperwork on routine maintenance just don't pay off.

Trouble calls—Any production supervisor may call dispatcher for help with electrical trouble on the floor. Dispatcher makes out work order, sends machinist to job, bypassing maintenance supervisor to save time. If machinist finds electrical trouble, he calls for electrician.

One electrician stands by in the shop at all times to answer routine trouble calls. If trouble develops with a more complex piece of electronic equipment, the dispatcher knows enough about the plant's electrical facilities to decide whether to send an electrician. If the man needed is not in the shop, the dispatcher knows where he is.

FLEXIBLE SCHEDULING

It gets maximum cooperation from production foremen. Under R-F's schedule (by periods rather than by specific days) they don't try to postpone necessary maintenance. Instead, they maneuver free time for the equipment, let maintenance know when equipment will be free. This way, there's no unnecessary interruption of production, no waste motion, no waiting around by the electrician for an idle machine.

Within a given period (say, 30 days), dispatcher's file shows which machines must be inspected. To firm his scheduling, production control every day sends him a list of machines slated to be idle. He checks list against his inspection cards, schedules work on a specific day.

Inspection intervals (30, 60, or 90 days) are based on past experience. Intervals are as long as is consistent with a high standard of machine performance. They are under constant observation, and revisions are made whenever needed. For instance, certain electrical panels formerly checked once a week are now checked only once a month.

As far as possible, major overhauls are done during the annual two-week vacation period, when the plant is shut down.

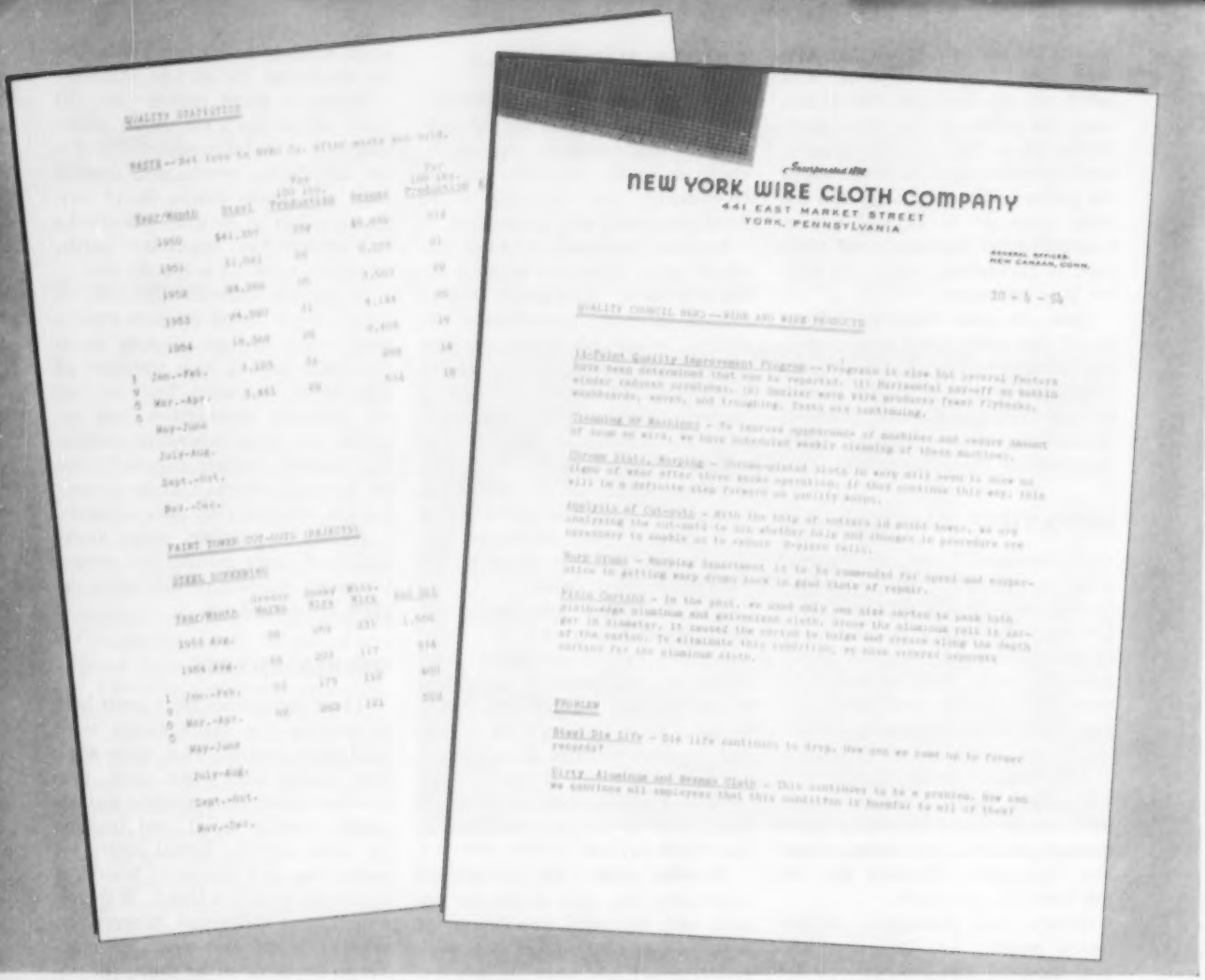
WEEKLY CHARTS

These summaries are a great help in keeping the maintenance work load under control. They show work done during week (new work, preventive maintenance, routine maintenance, trouble calls) and backlog for week ahead. Actual hours for work done and estimated hours for upcoming work are listed. If there's too great a difference between estimated hours and available manhours for work to be done, the supervisor knows he'll have to go on overtime, bring in help from outside, or perhaps even hire more men. Thus far, there has been no need for outside help to clean up backlog. But new work often is farmed out to avoid interference with routine and preventive maintenance.

Two things about the work estimate for the upcoming week:

. . . It's padded a little for emergencies—the little items that everybody knows will come up every day. Experience is the guide here.

. . . There's always more backlog than can be handled in the week's available hours. "We like to stay about two weeks behind on backlog," says Gallaher. "That way, we've always got something to do and there's always some pressure. We take care of things in the order of their urgency. So our weekly summary charts always list some non-urgent projects that may not be done for weeks or even months."



Incorporated 1892

NEW YORK WIRE CLOTH COMPANY

441 EAST MARKET STREET
YORK, PENNSYLVANIA

GENERAL OFFICES
NEW CANAAN, CONN.

NEWS BULLETIN (bi-monthly) tells employees the score on quality, gives them basis for discussion and recommendation at quality-council meetings. Also reports action on suggestions, current problems for solution by employee group.

Better Way to Promote Quality

Workers' council brings employees right into the act. With a forum to talk in—and facts to talk about—they keep quality moving up for New York Wire Cloth.

BETTER QUALITY with workers' help? Sure thing. An employee council has been serving effectively since 1952 at the three plants of the New York Wire Cloth Company, Inc., York, Pa.

The set-up is similar to many employee-employer safety councils. But at NYWC emphasis is entirely on product quality. Broad aim: to promote quality consciousness among the company's 500 employees. Secondary aims: to improve communication with employees, and give them opportunity to take part in the operation of the plant.

Results have been spectacular, persistent. A couple of examples:

. . . *Out-of-square cloth* was the one biggest headache. The quality council finally pinned the blame on out-of-square looms. Then worked with management to set up a more systematic inspection procedure—not of the cloth but of the looms, where the trouble originates. Take a look at the record.

Per cent of rolls out of square:

	Steel	Brass	Aluminum
1953	40.7	5.3	1.7
1954	13.5	0.3	0.9
1955	11.0	0.2	0.6

. . . *Defects in workmanship* are the final measure of employee attention to quality. Here's the rec-

ord after the council spearheaded an intensive drive last year for better quality:

Defects per 100 rolls of cloth during 1955:

	Steel	Brass	Aluminum
Jan.-Feb.	10	13	12
Mar.-Apr.	10	4	11
May-June	7	7	9
July-Aug.	8	5	7

The figures above show real gains. But there are other gains as well. Stuart Jones, vice president, wire products division, notes that customer complaints have been cut very nearly to the vanishing point since the council was formed. He feels its major accomplishments are:

. . . *For the employee:* Increased concern for product quality, a greater sense of participation, and personal recognition for suggestions contributed.

. . . *For the company:* Lower production costs arising from decreased waste; higher-quality product.

. . . *For both:* Better communications; a chance to use council membership to develop individual responsibility for bigger jobs.

Pitfall—But "employees can become too quality conscious," warns Paul Kistler, NYWC's director of organization. In the first flush of determination to spot and eliminate defects in workmanship, the number of defects reported actually increased. It was found that workers were rejecting material that they formerly would have passed.

Says Kistler: "We had to spell out our specifications in greater detail, then train employees to adhere closely to the official—not personalized—standards."

HOW COUNCIL IS SET UP

Each foreman nominates a member of the quality council, usually with the advice and help of the other members of his department. Membership is changed once a year. Turnover like this gives as many employees as possible a chance to serve on the council. Total membership is 52. The only member who represents management is the chairman. He may be either a general foreman, a plant superintendent, or some other plant executive appointed by the plant manager.

The council is broken down into five committees, each with 6 to 16 members. These committees represent the two smaller plants and the three shifts of the main plant. The council chairman presides over each committee. Once a year there is a dinner meeting for the entire council membership. And every other month—on company time—each committee holds a meeting.

HOW COUNCIL WORKS

At committee meetings, council members are fed the same statistical information that management men receive. Top company management believes that employees who are given all the facts will tend to come to the same decisions that management comes to. And experience with the quality council has fully justified this opinion.

Basis for the discussion at committee meetings is a news bulletin (sample sheets are shown on opposite page). This carries the latest reports of progress on production problems and introduces any current problems for which the company seeks a solution.

Suggestions made from the floor at committee meetings are formalized by the chairman. For this purpose, he uses a "Memo to Management" form. He prepares this in quadruplicate. It contains spaces for the chairman to jot down name of employee, his group, date of meeting, and subject as soon as a constructive suggestion is made. After the committee meeting has been held, the chairman takes the suggestions to the next foremen's meeting—always scheduled to occur within the 24 hours of the committee meeting—for full discussion and evaluation. Recommendations of the foremen are then noted on the "Memo to Management" forms.

If an individual foreman responds favorably to a suggestion contributed by a member of his department, the memo is carried up to the plant superintendent. The superintendent can either accept the suggestion—or reject it. His decision either way is noted on the form. If his decision is favorable, the name of the person assigned to carry out the work involved is also noted. Two copies of the form—one to keep and one on which to report progress—are then detached and forwarded to the person to whom the project is assigned.

At whatever stage the memo stops, the decision—either favorable or unfavorable—is at once reported back to the original suggester. Management feels that nothing discourages the flow of employee suggestions quite so much as to treat them with blank silence. It follows that even though the verdict goes against a suggestion, the employee must be promptly notified of all action that was taken on it.

The fourth copy of the "Memo to Management" form (with all notations up to the time the suggestion has been either carried out or abandoned) is placed in the employee's personnel folder.

Better than a box—NYWC has no suggestion box at all. The only formal method of securing employee suggestions is through the council committees. The many benefits of the council system, the company feels, more than outweigh the debatable advantages to be gained from the suggestion box system.

"Here is our problem. What shall we do about it?" That frank question always comes up at committee meetings. In answer, council members have repeatedly made constructive, practicable recommendations. It's almost equally important that council members now serve as "straight-from-the-horse's-mouth" communicators in reporting committee findings to their fellow-workers.

Good training, too—Besides giving the employee a chance to participate in company problems, the council is looked upon—and functions—as a training school. From time to time, various company executives speak at committee meetings on such subjects as quality statistics, quality standards, quality inspection, quality from the salesman's viewpoint, and quality-mindedness (a matter of employee attitude).

Extra-curricular activities are sometimes found for the members of the quality council. On one occasion an employee member was asked to go out with a salesman and call on several big buyers of wire-screen cloth. He was able to report—with the conviction of first-hand observation—what customers thought of the current product.

Another member went out with the plant manager to check a complaint. His intimate knowledge of on-the-job difficulties helped solve an unusually tough problem.

Ready Now for Lightning?

The odds are uncomfortably high that some day your plant or your power lines will be hit. Unless you've prepared for that day, you'll be in for trouble. So why not let an expert tell you where to look for it, how to avoid it?

THE PROBABILITY that lightning will strike a building 100 feet square and 50 feet high, and among many similar buildings, is about one in 250 per year. At an isolated location, the probability is about one in 17. On the average, electric-power transmission lines — like those feeding your plant — are struck once per mile per year. In other words, it is uncomfortably probable that your plant, or its transmission lines, will be struck some day.

Lightning strokes cannot, of course, be prevented. But the stroke current — which averages 20,000 amperes, may last as long as one second—*can* be directed into paths that result in a minimum of damage to the object hit.

DANGER AREAS

The metal frame of most factory buildings is heavy enough to withstand any lightning current without damage, and without hazard to people inside. Therefore, except for shattering or dislodging of any masonry or other covering between the point of impact and the nearest metal, the building as such is relatively free from danger. But there are many other parts of the plant that must be protected:

. . . *Masonry smokestacks* can be severely damaged.

. . . *Explosive atmospheres,* if present at your plant, call for extra care. While, as outlined above, there probably will not be any direct damage from the stroke, a gap between metal objects may be arced by the current, or a rusty joint may cause a spark.

. . . *If transmission lines* close to the plant are hit the stroke may cause hazardous surge voltages at the station apparatus. These surges cause flashovers, tripouts, and loss of power until the circuit can be reclosed.

. . . *Circuits leading indoors* are subject to lightning surges as long as they are directly connected to overhead lines. Long cables tend to make the terminal equipment less subject to surge failures, as the cable then requires more surge energy to charge up to a hazardous voltage.

. . . *Low-voltage circuits* (115/230- and 480-volt) are also danger spots. A flashover through air with 115 volts from line to ground has a tendency to clear itself after a half-cycle of follow current; but at 480 volts the power-current arc is sustained, and lightning protection is essential to prevent damage. Further, induced voltages from nearby strokes can be important on exposed 480-volt circuits that have ungrounded neutrals.

. . . *In transformers,* surge voltages are induced from the primary to the secondary. The relatively high reactance from primary to secondary tends to limit the amount of voltage transmitted to heavily loaded secondary circuits, but no definite limit can be set for a circuit that is self-protecting.

. . . *Motors* that are directly connected to overhead lines (as many in the 2400-volt-and-up class are) are vulnerable to failure from lightning surges. Their insulation strength is low compared to oil-filled equipment such as transformers, so special provisions are necessary to give adequate protection.

PROTECT DANGER SPOTS

Smokestacks are, of course, struck more often than any other structure. For steel stacks the only protection needed is a metal contact from base of stack to ground, to avoid flash-

By A. M. OPSAHL
Lightning Arrester Engineer
Westinghouse Electric Corporation
Pittsburgh

ing over or through the concrete base. Brick stacks should have full lightning-rod protection to avoid shattering, in case of a stroke. The rods in the vent area should be of a material that will not corrode in the atmosphere involved. Several points extending above the rim of the stack are recommended, as well as two or more down leads well grounded at the bottom. Reinforced-concrete stacks should be built with the reinforcing bonded so that it is continuous from top to bottom. Without this bonding, stroke current through the concrete between alternate paths to ground can cause structural damage. And the ladder on any stack should be tied top and bottom to the lightning rods.

Hazardous areas—More elaborate protective measures are required in any area where an explosive atmosphere exists, to eliminate the possibility of sparking. For this kind of protection, all paths that lightning might take must be bonded together so that there will be no arcing between alternate paths. For example, a stroke current to storage tanks will tend to go to ground over several paths. Any inlet or outlet pipes would be paths to ground, and any gap or rusty contact between pipes and tanks could cause a spark.

In tank storage areas, a high-current stroke may develop enough voltage to cause sparks between the building that's struck and drums stored nearby. To protect against this hazard, lightning rods should be carefully grounded. This can be done by having a buried grid of wires under the floor. Or conducting poles or masts can be used where directly mounted rods would discharge current too near any hazardous area. Further, overhead wires between the masts will form a protective cage or umbrella over the hazardous area.

Electrical equipment—Some electrical equipment comes from the manufacturer with built-in arresters to protect against surge voltages picked up on the overhead lines. However, you should not assume that these arresters are properly connected for your system. It pays to make a thorough check on these areas particularly:

. . . *In larger stations* with several lines, the arresters should be mounted on or very near the transformer terminal. No arresters are normally used on the incoming-line side of the breakers unless they are operated open for an appreciable part of the time. This is because the arresters on the transformers are usually close enough to the breakers and switches to offer good protection. A single set of arresters on the bus of a multiple transformer station may be adequate if, in the high-voltage end of the station, the distance in circuit feet between arrester and transformer is not over one foot per kilovolt of circuit voltage.

. . . *Rotating machines*, since they cannot have the same amount of insulation as oil-filled transformers, require extensive protection. Good practice is to have an arrester on any exposed line (i.e., on the high-voltage side of the transformer serving the machine), another on the line side of the reactor, and a third out on the line or cable to take the brunt of an incoming surge. And an arrester of special low characteristics and a capacitor may be connected from line to ground to further limit the surge voltage at the machine. This combination should limit the incoming surge so that the stress in the machine is held to a safe value. Machines connected to the bus by more than 100 feet of metal-sheath cable should have additional arresters at the machine terminals.

Often, in an industrial plant, a small number of arresters, carefully placed, can protect many machines. The cost of a survey by experts in the field may well be repaid by savings in arrester cost.

. . . *Indoor equipment* tied to an overhead line through a section of metal-sheath cable may need an arrester at the equipment to supplement the arresters at the line terminal. There is no simple rule for spotting these additional arresters—again, it's advisable to obtain qualified advice.

. . . *Power circuit fault protection* is another important point. During lightning strokes, spark-over or puncture of insulation is common. The result: short circuits. Failures of this kind cannot often be prevented economically. Therefore the interrupting capacity of your circuit breakers must be sufficient to cut out the faulted section of the circuit as quickly as possible, to eliminate the far-reaching damage of a sustained short circuit.

Good grounding is vital to protection

In any form of lightning protection, the lightning current should be discharged to ground over as short a path as possible. Both ground resistance and long grounding leads result in voltages on the lightning conductors that tend to arc over to nearby grounded objects.

Ground resistance is usually the most important factor in this voltage rise. Since the major part of ground resistance is within about 6 feet of a ground rod, a number of rods spaced about 10 feet apart and interconnected with buried wires will provide a most effective way of reducing resistance to ground.

The lowest resistance to ground in any given locality is usually the extensive buried-pipe system—such as the water supply — that plants usually have. Grounding to a system of buried pipe reduces the voltage caused by high lightning currents to a minimum.

Grounding cables for lightning rods should be about ⅜ inch in diameter, and should be securely attached at all joints, so that they cannot easily be dislodged or broken off mechanically.

Usually, the length of grounding conductors cannot be changed. But the use of several parallel cables, separated from one another by at least several feet, will reduce the voltage caused by the passage of lightning current.

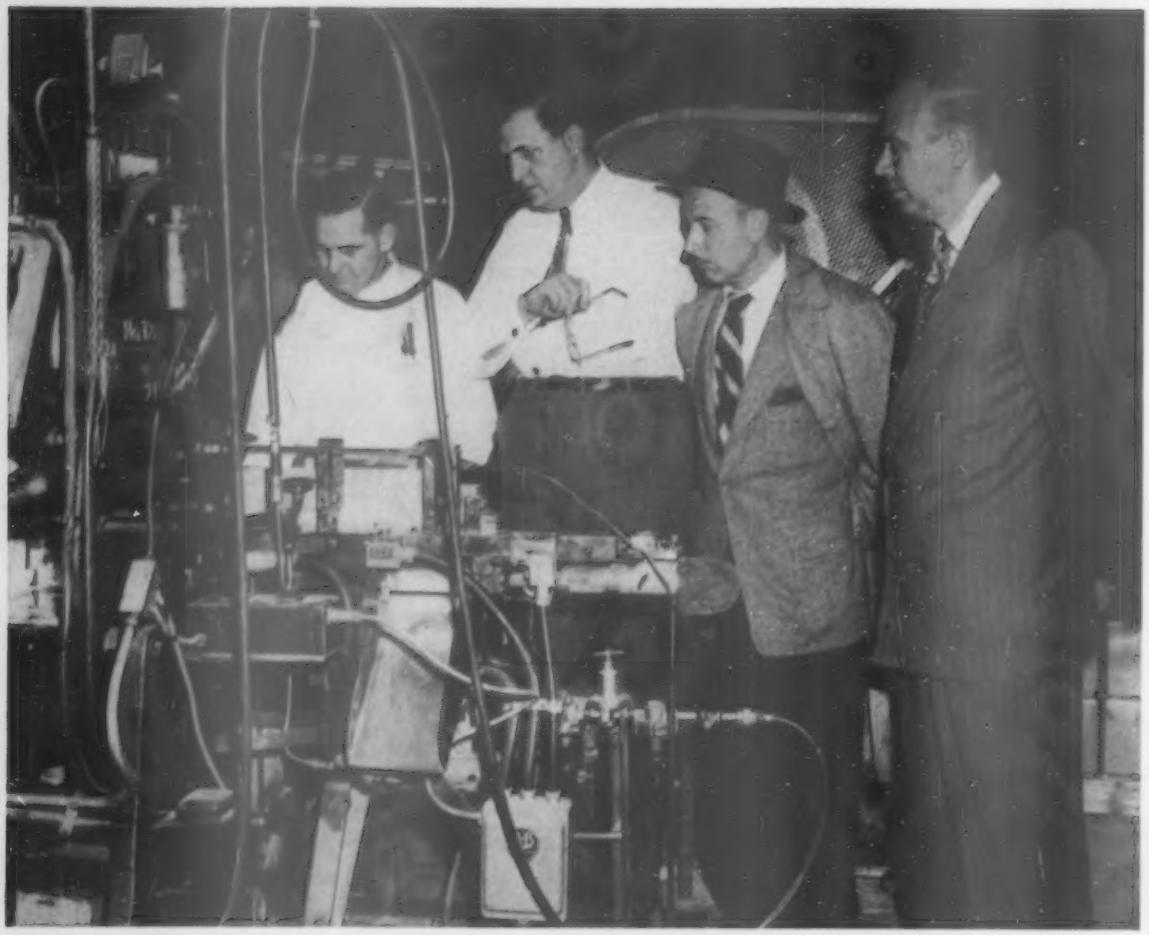
Surveys needed — Lightning-protection equipment is easily forgotten; and there is no indication of weakness until it has failed to protect your plant or its electrical equipment. A periodic survey should be made to be sure that:

. . . *The tallest structures* in the plant area have exposed steel or lightning rods to intercept any lightning stroke.

. . . *Ground connections* are OK.

. . . *There are no joints* or gaps in ground paths in hazardous areas.

. . . *All electrical circuits* have adequate lightning arresters and fault-interrupting devices to prevent sustained arcing.



Tour a big plant and come home with new ideas. That's the "why" behind Signode's travel program for supervisors. They visit plants of other companies as well as Signode's own.

Wider Vistas for Your Supervisors

Signode's prescription: Take supervisors on visits to other plants. It gets them out of the rut. Broadens their outlook. Opens their eyes to new methods.

WHEN Signode Steel Strapping Company, Chicago, wanted to lift the vision of its supervisors beyond their own jobs, it invited them to make visits to other plants and companies in the area. Here's the kind of payoffs the visits produced:

. . . Better teamwork. "There's been a tremendous increase in cooperation between departments," says J. M. McGregor, vice president of manufacturing for Signode.

. . . New ideas for solving manufacturing problems. Many an idea picked up on one of these visits has been incorporated in the layout of its new plant.

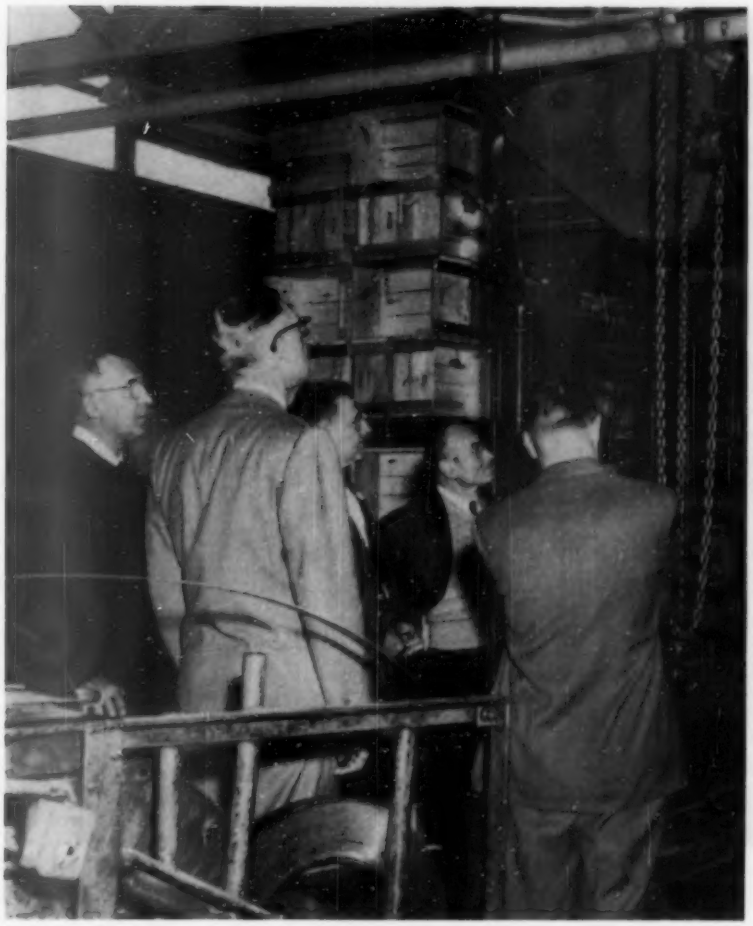
. . . Appreciation of suppliers' problems. Knowledge of vendors' efforts to control quality cuts down on tendency to pass the buck and to fix blame for manufacturing difficulties on the suppliers.

. . . Broader personal horizons. Supervisors gain knowledge of processes that precede and follow operations in their own plant.

. . . Jarring facts about competition. First-hand evidence of use of competitors' products gives incentive for higher quality, lower costs.

. . . Practice in delegation. Visits take place during working day. It's up to each supervisor to have his house in order while he's gone.

How plan works — Visits are made four times a year. Range from trips to nearby suppliers and customers to plants in widely divergent industries. Such as an eye-opening trip (for supervisors in machine building and steel fabricating) to



Tour a small one

It may be just as good an idea-sparker as a big, complex plant, Signode foremen find.

Ford's new super-mechanized assembly plant. Recently Signode supervisors visited the company's own new Glenview (Ill.) plant (photos above). Signode has found supervisors' curiosity is sometimes greatest in plants in their own company.

Typical itinerary for a plant visit: About 40 supervisors meet in Signode's cafeteria at 11 a.m., lunch there, then drive their own cars to plant to be visited. Tour proper starts with a general briefing by a host-company spokesman, when supervisors get information on personnel practices for hourly employees—such as rest periods, wash-up time, benefits, etc. They've found that Signode's benefit policy is well in line with other progressive companies in the community.

After the briefing the supervisors break up into five groups. Spend next couple of hours with a host guide observing manufacturing methods throughout the plant. Tour is usually over by 4:30 p.m.

Signode makes a point of cautioning supervisors not to snoop or pry on visits. Itinerary and rules for conducting tour are left to the host company. Signode does advise its supervisors to be alert, to look for procedures and methods applicable to their own operations.

Making arrangements — Responsibility for making arrangements with host companies is up to the Plant Tours Committee of Signode's Supervisory Association, headed this year by W. N. Blackstad, manager of special accounting. Contacts are made through former employees, acquaintances in professional societies, friends made at seminars and conferences, and through suppliers and customers. The committee looks for plants with related problems or operations, but finds almost any type of plant visit helpful.

Formal request for an invitation is channeled through personnel into the personnel department of the host company. There have been no turndowns to date, partly due to fact a company is pretty well sounded out first. And because benefits seem to be mutual.

Diversified activities—Plant tours are only one of four key activities that have helped to keep Signode's Supervisory Association dynamic since its inception 10 years ago. Here are the others:

. . . *Point-blank communications.* In hard-hitting Q-and-A sessions at quarterly dinner meetings top management gives supervisors inside information about plans and operations. Average attendance, 60.

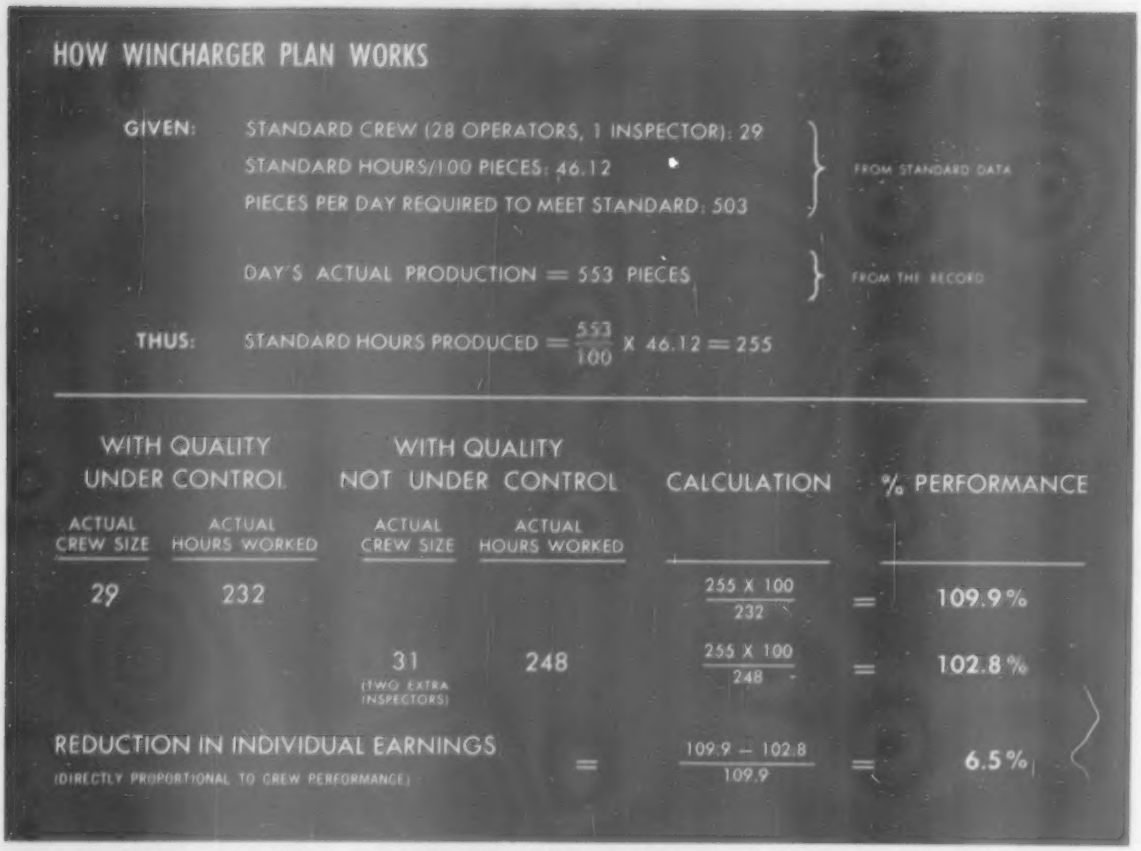
. . . *Weekend in the country.* A 3-day golf outing at a country club provides opportunity for a guards-down social interchange by foremen, staff, executives. Attendance, 40.

. . . *Something for the ladies.* An annual all-out dinner, dance, and entertainment for husbands and wives brings wives into the management circle. Attendance, 100%.

. . . *Extras.* Like an evening at the ball game last summer to see the White Sox fighting for the pennant. Attendance, 45.

Club make-up—Signode's Supervisory Association started out as a foremen's club, then expanded to include supervisors in *any* plant or office function. Now only about one-third of its 66 members are from manufacturing. Rest come from engineering, sales, general administration. Club membership goes up the line from first-line supervisor to company president. Also includes a couple of ex-supervisors who were downgraded as a result of a recent production consolidation.

What's its cost?—McGregor, club founder and permanent advisor, feels people get more out of an activity if they pay their share. That's the principle followed both in Signode's employee benefits and profit-sharing plans, and by the Supervisory Association. Members pay $12.50 per year dues, plus a good share of the golf weekend cost. Get no free lunch on plant tours, furnish own transportation. Company contributes about $37.50 per man yearly. Supervisors and top management alike say it's well worth it.


HOW WINCHARGER PLAN WORKS
GIVEN:
STANDARD CREW (28 OPERATORS, 1 INSPECTOR): 29
STANDARD HOURS/100 PIECES: 46.12
PIECES PER DAY REQUIRED TO MEET STANDARD: 503
FROM STANDARD DATA
DAY'S ACTUAL PRODUCTION = 553 PIECES
FROM THE RECORD
THUS: STANDARD HOURS PRODUCED = 553/100 X 46.12 = 255
WITH QUALITY UNDER CONTROL
WITH QUALITY NOT UNDER CONTROL
CALCULATION
% PERFORMANCE
ACTUAL CREW SIZE
ACTUAL HOURS WORKED
ACTUAL CREW SIZE
ACTUAL HOURS WORKED
29
232
255 X 100 / 232 = 109.9%
31
(TWO EXTRA INSPECTORS)
248
255 X 100 / 248 = 102.8%
REDUCTION IN INDIVIDUAL EARNINGS
(DIRECTLY PROPORTIONAL TO CREW PERFORMANCE)
= 109.9 − 102.8 / 109.9 = 6.5%

EASY FOR WORKER TO FIGURE HIS OWN PAY—THAT'S ONE BIG ADVANTAGE OF THIS PLAN.

New Kind of Quality Incentive

This brand-new technique disproves the old theory that you can't ask for higher quality without losing productivity. And (see above) it's easy to administer.

YOU CAN HAVE your cake and eat it too—at least when it comes to setting up a quality incentive that doesn't lower production. At least that's been our experience at Wincharger Corporation.

Two years ago we established what we believe to be a unique quality incentive on top of our regular production incentive. And the results have been a two-thirds reduction in defects, with a small but welcome increase of 5% in productivity —rather than the production loss that might be expected. Another big plus, particularly surprising in view of the greatly increased emphasis on quality: *The number of inspectors required to check production has also been cut two-thirds.* The plan is easy to administer and—even more important—easy for employees to understand; as the sample calculation above will show.

How does it work?—Here's the basic theory: As long as quality is kept within limits, the output of a production crew is just sample-inspected. This partial inspection requires only one inspector. But when quality gets out of line, additional inspectors—usually two more—are called in and all work is 100% inspected. And—here's where the quality incentive comes in—the crew must absorb the cost of this extra inspection time. It is charged against the crew's production incentive earnings. Having to "carry" the extra inspectors, in the typical case above, reduced individual incentive earnings from 110% to 103%. And this is enough reduction to cause the crew to gets its quality level back within limits, thus eliminating the extra inspectors from their payroll —usually within a day.

There's nothing about our production that makes this incentive applicable only to our kind of operation. Our operation is a typical one: producing chassis units for table-model radios and clock-radios.

Work force is divided into assembly crews; each crew has assigned

By RALPH T. DINGMAN
Chief Industrial Engineer
Wincharger Corporation
Sioux City, Iowa

permanently to it one tester-checker, who inspects the team's work on a sampling basis. Average crew consists of about 30 assemblers, solderers, relief operators. (Range in crew size is 24 to 40 operators.) During the year, between one and seven crews work under the incentive outlined here—and the average, on a year-round basis, is three.

Each crew works on different models of chassis. A lot usually runs for several days, can run as long as two months. All models that the crews work on are covered 100% by both production and quality standards. Before the quality incentive was installed, most assembly crews were earning satisfactory bonus, and—on most days—producing acceptable quality. Units were 100% inspected for physical (visible) defects. (Electronic performance was not, and is not now, checked until later in the production process.) But some crews' quality occasionally slipped out of limits. With several large groups of operators involved, it was a difficult supervisory problem to maintain records showing those primarily responsible for lowered quality.

It was decided to avoid, if possible, any system with such detailed record-keeping, and try to develop a system that provides each crew—as a crew—with an incentive to do good work consistently.

Keys to new system

The new quality incentive—which, remember, is applied on top of the regular production incentive—is based on two principles; one old, one new. The first:

. . . *Statistical quality control.* Our quality-control department was anxious to apply statistical quality control to the problem. But our quality level had never been consistently high enough to use this technique. It was made workable by the second principle:

. . . *Penalty for poor quality.* As outlined earlier, here's how our penalty for poor quality works. Each production crew has assigned to it enough checkers to perform a standard sampling inspection. As long as quality stays within limits, this standard crew is in a good position to earn bonus by increasing production beyond standard.

However, whenever the work being inspected on a sampling basis becomes out of control for a full day, enough of these tester-checkers are added to the group to inspect the crew's production 100%. (Normally, three tester-checkers are required for 100% inspection; whereas one suffices for sample inspection.) They remain as part of the crew until the crew has had a full day of production within limits.

Just how this "additional help" is charged as a penalty to the group will be obvious from the sample calculation (facing page) of a crew's daily incentive earnings; (1) with quality under control, (2) with quality not under control.

Since the crew's earnings are directly related to incentive performance, it's obvious the difference in earnings (difference between 109.9% and 102.8% of standard) is sufficient to make the crew anxious to get the two extra penalty inspectors off its payroll.

How about allowances?—Under the system, provision is made for defects—such as material defects that are beyond the control of the operator. If defects of this type put quality out of limits, 100% inspection is called for, but the quality-control department advises the industrial engineering department not to charge the extra testers to the affected crew. Who decides when the defects are "beyond the control of the crew?" An experienced quality-control foreman. This is not a difficult point of administration of the plan, and has never been a basis for argument. Other details . . .

. . . Time standards were not changed when we set up the new system. As a result, workers now earn less on days when quality is out of control than they did before. This has not proved a problem—probably for two reasons. Under the new system, quality has been consistently high—so the penalty has been invoked rarely. And operators working under the system are paid for defective sets—although our union contract states that faulty workmanship is not paid for under the incentive plan. (Operators realize that subtracting faulty sets from the production count—if we decided to adopt this in place of our present control—would be a far more severe control action than the addition of extra tester-checkers.

. . . *Training allowances* are included, to take into account that it takes time to bring quality of a new model under control, and that new operators require some time to develop skill and accuracy.

Training allowance charts were set up taking both factors into account. They establish the number of days allowed a group to bring quality within limits before a penalty basis is established. During the "training period," every unit is checked, but the extra tester-checkers are not charged to the group. For any new situation, the crew is notified in advance of the allowance time. (The training allowance charts were established on the basis of Zenith Radio experience records, modified by Wincharger experience to meet our particular needs.)

Allowances vary from one day to 12 or more days. Generally, crews require from one to four days to bring a model within control limits, although extreme conditions of model change, or a high percentage of inexperienced operators in the group may call for an allowance of seven to 12 days—sometimes even more.

Sample allowances from chart:

. . . *If no change in the model,* it has been run recently, but the crew has 30% inexperienced help: Condition 1, 4-day allowance.

. . . *100% experienced crew,* no model change, but model has not been run by this particular crew for four months: Condition 1, 4-day allowance.

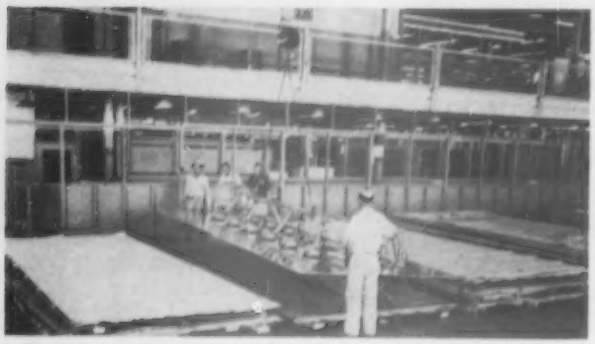
. . . *No model change,* model not run by crew for four months, and crew includes 30% inexperienced help: Condition 2, 7-day allowance.

. . . *New model,* similar circuit and chassis design to past models, 100% experienced crew: Condition 2, 7-day allowance.

GOT SPECIAL PROBLEMS? Need help? Cast your eye down the long list of low-cost reprints that other FACTORY readers have found valuable. Page 288.

FACTORY | COST-CUTTERS

By WALTER F. WAGNER JR., Associate Editor, FACTORY



Big Sheets to Handle?

Metal sheets measuring 96x250x5/16 inches, weighing 800 pounds, are handled easily by this new device. It's in use at the Convair Division of General Dynamics Corporation, San Diego. It consists of 12 suction cups, suspended from a steel framework with eyes for crane pick-up. Air is forced into and out of cups through a central control panel; but each cup is supplied by an independent air line in case one or more cups or lines should fail. Device was designed by Merle Stevens of Convair's plant engineering mechanical design section, built by the company.

Serve 'em Up on Trays

That's how Skil Corporation (Chicago) handles the lightweight, precision-machined parts used in its portable power tools. The trays serve three purposes:

. . . *Reduce parts damage* by keeping each piece separated from its neighbors.

. . . *Provide an automatic count.*

. . . *Promote quality control,* since parts must be handled more carefully when they're placed in a tray than when placed—or tossed—into a tote box.

Skil has over 2000 trays, of 14 different types. Made of ⅛- to 3/16-in. aluminum sheet, all trays are 11x17½ inches. Cost: about $6.50 each. The trays are purchased cut to size, with holes drilled or punched to specification. Skil installs studs, and assembles them.

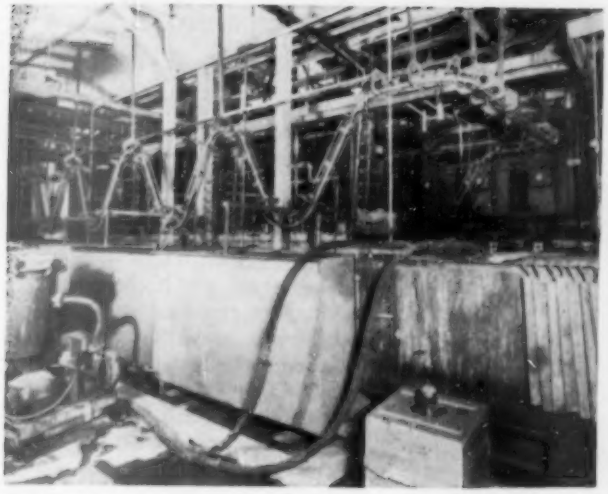
Trays are either double-deck, like those on shelves; or single-deck, like those on hand truck.

Window Service for Welders

Getting parts into and out of a welder's booth is often a problem. As a safety measure (particularly to guard against eye damage from welding flash), the welder usually stops work when a handler enters.

But not at Westinghouse Electric Corporation's Columbus, Ohio, plant. There, windows were cut in the side of each welding booth. Racks, big enough to hold six tote pans of parts, were installed in the openings. Now, all a handler has to do is push aside the tarpaulin (top of photo) covering the opening, place his delivery on the rack, lower the tarp into place. His exposure to welding flash is minimized. And the welders' output has been boosted a healthy 11%.

Cost per booth for this simple adaptation: $60 for the rack (an adaptation of a standard Nestier unit), $12 for miscellaneous materials, 6 hours of labor.



New Kind of Roller-Coaster

Conveyors that dip into tanks are nothing new. But the dips in this conveyor are about the sharpest we've seen. Which saves a lot of space at D. L. Auld Company, Columbus, Ohio, where this photo was taken.

The conveyor is used to dip the company's product—metal emblems, name-plates, and the like—into a series of dip tanks for cleaning, ahead of an electroplating operation. In less than 80 feet of forward travel, the conveyor makes 18 vertical turns of 12-in. radius, four horizontal turns of 15-in. radius.

How are the short turns possible? The trolleys on the conveyor (made by The Landahl Conveyor Company, Cleveland) are connected by rods, which pivot freely at both ends. A close glance at the photo will show how the tracks hold the trolley (four roller-skate wheels mounted around a cylindrical center housing) to its appointed path.

Kink in Line Saves Time

A straight line may be the shortest distance between two points. But for assemblers at Ebco Manufacturing Company, Columbus (Ohio), a straight-line conveyor meant a long walk between jobs—and bottlenecked production of the company's water coolers.

So Ebco yanked out the straight conveyor, substituted horseshoe-shaped layout shown here. Result: Production jumped 25%.

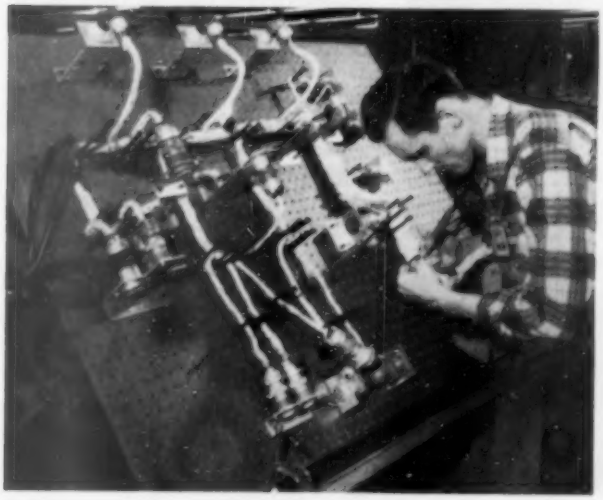
The new workplace layout has three advantages, according to Ebco engineers:

. . . *It's more compact,* puts work positions closer to the supply of tools and small parts.

. . . *It provides a larger* storage bank ahead of each assembly operation.

. . . *It allows more time* for hot tar, applied to the coolers' cork insulation, to cool.

Tapered rollers at corners allow smooth flow.



Do-It-Yourself Fixtures

This wiring arbor cost $53.25. It replaces one that cost $1200. And it was built, by the technician who's using it here, out of "erector-set" parts.

That's only one of countless examples of savings made possible by the "do-it-yourself" kit conceived by tool-test technicians at Minneapolis-Honeywell's Aeronautical Division (Minneapolis). Kit contains about $400 worth of various-sized sheets of perforated fiberboard, perforated metal sheets and strips, and an assortment of angle brackets, binding posts, clamps, wing and hex nuts, bolts and other fixtures for "bread-board" assemblies. From this collection of stock parts, production engineers and technicians can design and build their own wiring fixtures, temporary inspection fixtures, electrical test panels, and so on. Even short-run production jigs have been made from the kit.

FACTORY | NEWS

By W. A. STANBURY JR., Associate Editor, FACTORY

Hi-Speed Tube Inspection

The man in this photo (left) is watching an electrical watchdog inspect stainless steel tubing. The instrument is the first of its kind in a tube mill. For Carpenter Steel Company's Alloy Tube Division (Union, N.J.), it's giving closer quality control than was ever before possible. And it's inspecting at production speed. It's the result of nearly two years of joint development by Carpenter and Magnetic Analysis Company, Long Island City, N. Y.

Here's what it does: Inspects inside and outside diameter surfaces—full length and all around. Tests wall thickness, or subsurface of material with walls up to 0.070 inch. Detects any variation in chemistry (if set for Type 304 tubing, for instance, automatically rejects any other type). Handles full-finished, non-magnetic stainless steel ranging from ¼- to 3¼-in. O.D. Signals instant a defect passes through coil.

Hi-Fi Thickness Gaging

This man is watching an x-ray watchdog. The dial shows him the thickness of steel strip speeding from a 5-tandem cold reduction mill at the Irvin Works of U.S. Steel Corporation, near Pittsburgh. The dial is part of a new system developed by U.S. Steel and General Electric.

It's the first over-all thickness control in the steel industry to use screwdown control on the first stand (where most thickness variations originate) and a vernier system on the last stand. An x-ray gage between Stands 1 and 2 and a regulating system automatically signal and operate screwdown motors on Stand 1. The vernier system uses an x-ray gage after Stand 5, automatically varies drive-motor speed, thus controls final thickness. No vacuum tubes. Instead, transistors and magnetic amplifiers.

For a Plastic Coat Just Dip in Powder

Problem: To apply corrosion-resistant coatings (polyethylenes, polyfluorocarbons, nylon, etc.) to metallic and dissimilar-plastic molded targets that are too small or too irregular-shaped for spraying.

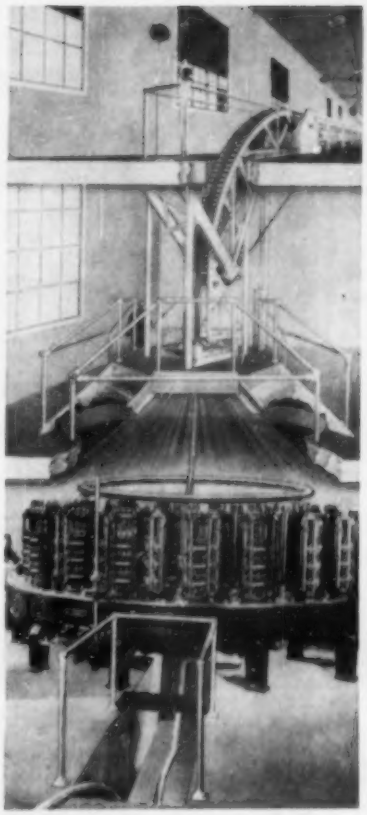
Solution: Fluidized coating. It's a new process just announced by American Agile Corporation, Maple Heights (Cleveland), Ohio. Fills the last major gap in the anti-corrosion coating field, makes it possible to apply on-the-spot protection. Cost: low. Time: half as much as needed in spraying.

Secret: A Powder Fluidizer—a compact unit with a specially designed gas distribution system that keeps the plastic powder in a turbulent, dense fluid state. You just preheat the target, dunk it in the fluidized bed for 10 to 15 seconds, then replace it in the oven for curing. You get a uniform coating up to 3/16-in. thick.

Right now, the process is available only for laboratories. Later, when larger coating units are available, general industry will find lots of applications.

Want to Line a Tunnel?

Then try the machine shown above. Last month it finished the job of lining the 47½-mile San Joachin Pipe Line No. 1 (58½ inches in diameter) with cement mortar. The job began in the summer of 1952. The newly lined pipe, originally laid in 1932, will increase San Francisco's daily water supply by some 14-million gallons. Pipe Linings, Inc., Los Angeles, did the lining job.

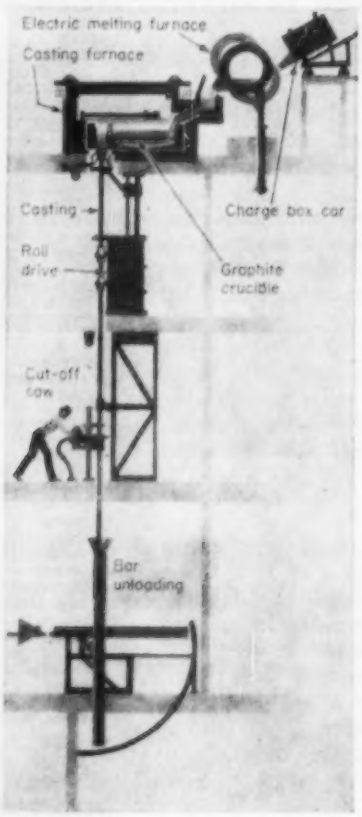


Straight-Up Tube Braiding

Biggest braider of its kind in the world. Stretches three stories high. Weighs 25 tons. Has alternate decks up to 96 carrier size. Makes metal braid that'll hold loads up to 60 tons. Makes it (for metal-hose and other tubular-braid industries) at the Niles (Mich.) plant of The National-Standard Company.

The new machine fabricates braids up to 22 inches in diameter—could make them up to 30 inches with mandrels of proper size. It handles wire up to 0.028 inch in diameter and as many as 15 parallel wires—and 29 wires or groups of small-diameter wires in braided braid. Textile Machine Works, Reading, Pa., joined National-Standard in developing the jumbo machine.

What's the braid used for? For metal and rubber tubing, for preventing elongation of flexible shaft housing, for shielding high-frequency electric cables, for tube and cable armor, and for many other uses that require strength with flexibility.



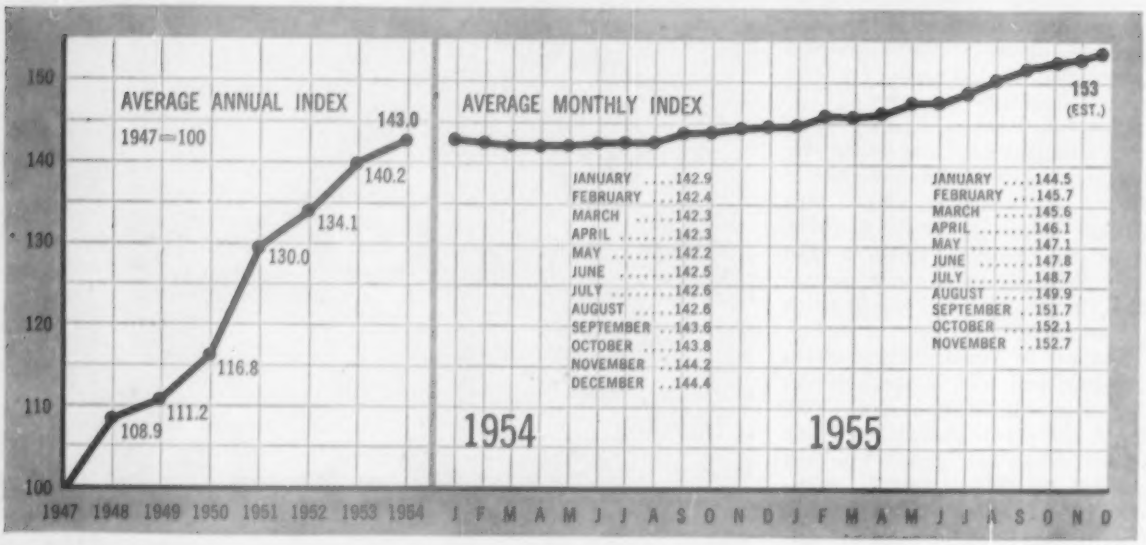
Straight-Down Bronze Casting

Bigger bronze bars and tubes from continuous casting. That's the latest word from the Barber (N.J.) plant of American Smelting & Refining Company. There, around the clock, five 4-story-high vertical production lines (like the one in the diagram) turn out an unbroken stream of bars and tubes up to 9 inches in diameter and 16 feet in length. Castings can be varied from true round to more complex shapes.

New? Sure is. Up to now, maximum diameter for continuous bronze casting was 5 inches; maximum length, 12 to 13 inches.

Advantages? Today, these larger sizes can be bought in long lengths that can be sliced as needed—or in the exact length needed. Scrap losses are minimized. Little machinery is needed. No trapped dirt, dross, sand, gases. And because of a superior chill rate, fatigue characteristics are raised 33 to 100%; impact strength, 15 to 100%. And tensile strength, yield strength, and hardness are boosted.

FACTORY | COST INDEX



Steel Supplies Vanish

Shortages are a prelude to higher prices and probable increases in the Cost Index.

STEEL in recent months has become a rare and greatly desired raw material for the gargantuan industrial diet. The available supplies will likely be rationed to customers through price increases, many of which may be announced shortly. Scrap prices have already been bid up to new highs. Since more than half the materials that appear in FACTORY's Cost Index are made wholly or partially of steel, the upward trend in material costs seems certain to continue.

Wage rates also will probably edge up in the months ahead. Labor is currently scarce and production high. Beyond that, several union contracts call for automatic increases in the spring. Barring an unexpected setback, economic forces should push the over-all cost index before it hits a plateau.

FACTORY's "Cost Index of Plant Maintenance" keeps you informed of monthly changes in cost of 1) upkeep, repair, and replacement of plant buildings and facilities; 2) upkeep and repair of operating equipment. Source of all figures: *U. S. Bureau of Labor Statistics.*

For complete information—including cost indexes for the 6-year period 1948-1953, and "10 Ways to Use the Cost Index"—send for a 16-page reprint of "FACTORY's Cost Index" (originally published in January 1954). Price 50¢. Address Editor, FACTORY, 330 W. 42nd St., New York 36.

	AVERAGE 1954	PREVIOUS MONTH (Revised)	LATEST MONTH (Nov.)
Building and Facilities Index	**139.6**	**147.0**	**146.5**
Materials	125.7	135.1	133.3
Brick	132.6	140.6	141.1
Elec. fixtures	115.1	125.0	125.0
Elec. switches, boards, fuses	141.9	153.5	153.6
Elec. wire, copper	130.3	178.1	178.1
Glass	137.3	152.2	152.2
Gutters, spouts, ducts	144.5	158.1	158.1
Gypsum products	129.2	129.2	129.2
Heating equipment	120.0	123.1	123.1
Lumber	124.2	134.2	133.8
Millwork	149.6	146.9	146.9
Paint	114.4	116.6	116.6
Pipe, cast iron	140.9	147.9	147.9
Pipe, steel	148.0	163.3	163.3
Pipe & tubing, copper	142.7	177.1	179.7
Roofing	110.5	121.6	106.9
Sanitary fixtures	144.3	151.5	151.5
Sash, metal frame trim	134.1	151.6	151.6
Solder	115.8	122.1	123.4
Steel, structural	170.3	186.5	186.5
Tanks, steel	121.0	131.7	132.4
Valves & fittings	130.6	142.0	144.6
Wire mesh	155.7	170.4	170.4
Labor	148.8	155.1	155.3
Carpenters	143.4	146.0	146.0
Electricians	152.1	157.6	158.1
Painters	151.8	161.7	161.7
Equipment Index	**144.5**	**154.3**	**155.4**
Materials	136.7	149.6	150.6
Abrasives	129.7	134.6	140.3
Alloys, non-ferrous	117.6	149.6	147.6
Bars & plate, steel	177.8	189.8	189.8
Bearings	140.7	145.5	148.0
Belting	135.1	148.0	148.0
Bolts, nuts & screws	174.9	189.5	189.7
Chain	137.6	161.8	161.8
Controls (electrical)	141.9	153.5	153.6
Gear-reduction units	143.8	151.9	151.9
Hand tools, mechanics	157.8	168.3	168.3
Lubricants	63.9	67.5	70.2
Motors	124.7	126.7	128.4
Non-ferrous metals	121.3	147.3	147.3
Precision tools	126.9	137.9	137.9
Pumps	143.2	153.1	155.3
Tools, cutting	129.0	150.3	150.3
Valves & fittings	130.6	142.0	144.6
Labor	145.9	157.4	158.7
All mfg. labor	146.0	153.6	156.1
Machine tool labor	153.2	161.2	161.2
FACTORY's COST INDEX	**143.0**	**152.1**	**152.7**

Remington Rand

BETTER BUSINESS METHODS

For Greater Profits Through Lower Costs

Integrated Preventive Maintenance Program Protects Capital Investment, Cuts Down-time and Product Costs

A well-integrated Preventive Maintenance Program will include: Equipment Records, Maintenance Parts Control, Written Work Orders, Work Scheduling and Executive Reports.

A Kardex Equipment Record (partially illustrated above) gives a complete machine history, at a glance. This record includes a history of depreciation, mechanical and electrical inspections, oil change and lubrication, plus a *maintenance cost summary* to aid management decisions on machine replacement or retirement.

Written Work Orders are essential for planning job assignments and for correct cost accounting. They alert maintenance executives to all conditions affecting work to be performed, put an end to the errors and misunderstandings that result from verbal orders.

Your *integrated* system will aid in the preparation of Executive Reports. Here, visibly-signalled Kardex records have proved to be most efficient. More details on this phase, and on the entire Maintenance Control System, are yours in booklet X1383, offered in the coupon.

Tight Maintenance Parts Control Helps Reduce Inventory Investment, Production Stoppage, Overtime

With tight control over parts and supplies, scheduled maintenance and necessary repairs are expedited; production stoppage and overtime are held to a minimum. Maintenance parts records should list available balances on hand, usage and trend of usage, vendors, date and quantity of last order. Effective control includes a numbering system to eliminate duplicate items, cut inventory investment. Kardex Visible records, with movable Graph-A-Matic signals, save time by focusing attention on items nearing reorder point. See booklet X1383.

Remington Rand Maintenance Control Systems Featured at Plant Maintenance Show!

Be sure to visit the Remington Rand Display of Maintenance Control Systems at the Plant Maintenance Show in Philadelphia Convention Hall, January 23 through January 26, 1956. You'll find us in Booths 1348 and 1352.

Visiting these booths then is the quickest and most practical way you have of acquainting yourself with *all* the latest and most effective Maintenance Control Systems yet developed. In a matter of minutes, you will be able to familiarize yourself with methods that can save you untold hours of valuable production time. You will find collected in this one display all the systems and procedures necessary for the all-inclusive production maintenance program that is best suited to *your* particular needs.

If for some reason you are unable to attend the convention, the same comprehensive information available there may still be obtained by contacting your nearest Remington Rand Office or indicating your interest on the coupon below. Remember this: keeping in touch with the latest methods of productive maintenance is the surest way of keeping on top with profits!

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

Room 1168, 315 Fourth Ave., New York 10

Yes, I would like to have Booklet X1383 ☐*; to be made acquainted with the latest Maintenance Control Systems* ☐.

Name_____

Title_____

Company_____

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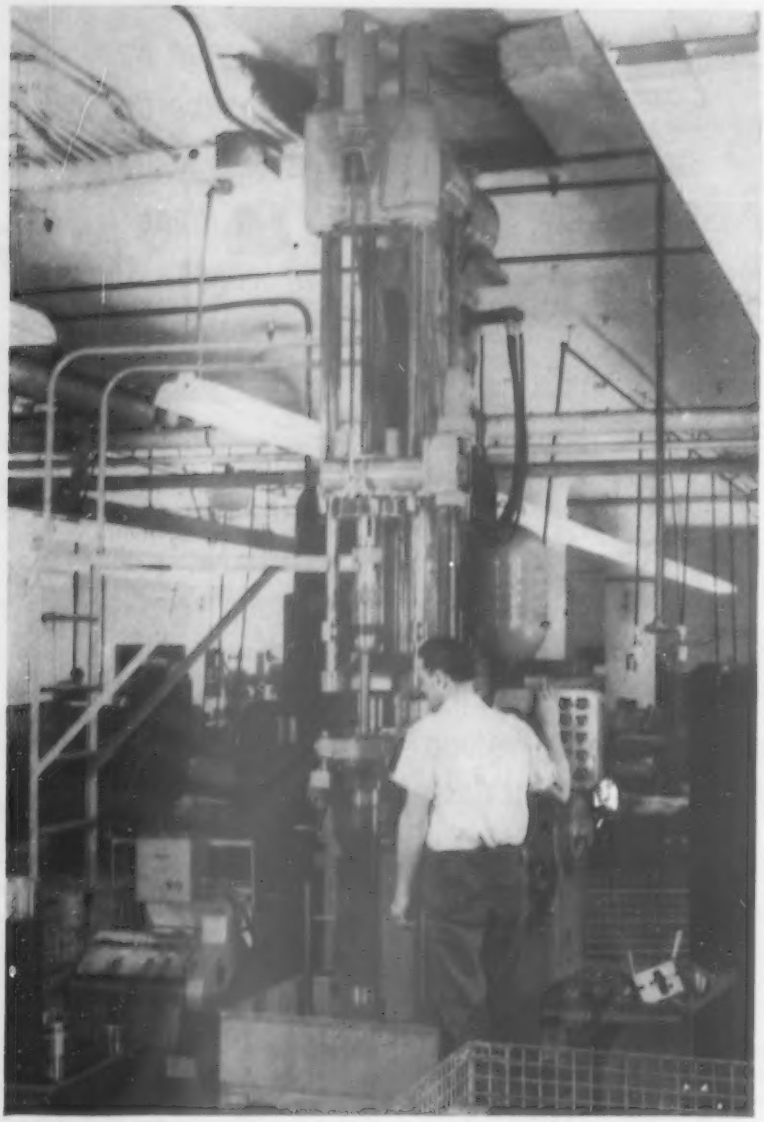
City_____ Zone____ State_____

1-20

Profit-Building **IDEAS** For Business

By CARL G. WYDER, Maintenance Editor, FACTORY



HIGH HONING MACHINE at Parker Appliance posed the question . . .

What to Do With a Too-Tall Tool?

Put it in a pit? Seemed logical, but it wasn't the best way. Here's why Parker poked it through ceiling.

This honing machine had to be located in this spot on ground floor. But with shafts up it was about 4 feet higher than the headroom. That seemed to call for a pit 4 feet deep. Or else a hole in the ceiling.

Feasible, yes, either way. No engineering problem at all. But Parker plant engineers—as all engineers should do—looked at the *con's* as well as the *pro's*. How about cost? They found that tearing up the floor and building a new foundation would boost installation costs far more than piercing the ceiling. Housekeeping? A pit is hard to keep clean. Layout? A pit would require more space in an already tight area. And safety? If one of those 2000-lb. cylinders to be honed ever slipped in loading, an operator in the pit would have no place to go.

So the skyward look won out. The office is overhead. At this point on the office floor a plywood-and-metal dome with sliding service panel caps the hole. This enclosure locks out the noise from below.

Where Can I Get J.I.C. Standards?

We are often asked this question. You can get copies of J.I.C. (Joint Industry Conference) standards from scores of equipment manufacturers, the National Machine Tool Builders' Association, and other numerous organizations that have helped create them.

For example, the National Electrical Mfrs. Assn. had a hand in drawing up J.I.C. electrical standards, as did the Industrial Furnace Mfrs. Assn., and Resistance Welder Mfrs. Assn. The last-named also helped formulate J.I.C. hydraulic standards. And there are pneumatic and punch press standards.

The Joint Industry Conference has no specific membership. The standards result from agreement in an open forum, held periodically by makers and users of industrial equipment. The standards represent practices in engineering and installation that serve as a guide for obtaining worker safety, uninterrupted production, and long life of equipment consistent with technological improvements. For more information, write the conference at P. O. Box 182, Northend Station, Detroit 2.

Harnessing heat for safety's sake

3M ADHESIVES

A temperature of 215° F. is just too hot to handle, no matter where you find it. Yet today's wall-type room heater must operate at just such a temperature *inside*, while staying cool enough on the *outside* so that even a child can touch it in perfect safety. What's behind this bit of modern insulation magic? A 3M product called EC-226—the versatile adhesive you see in action above.

Applied quickly and easily by spray, EC-226 has "quick strength" . . . takes a gentle grip on the insulation immediately upon contact, simplifying the manufacturer's assembly operation. Then the adhesive dries to form a lasting bond that *keeps* the insulation at its cooling job—without a slip—despite the boiling-hot temperatures generated inside the heater.

See what adhesives can do for you . . .

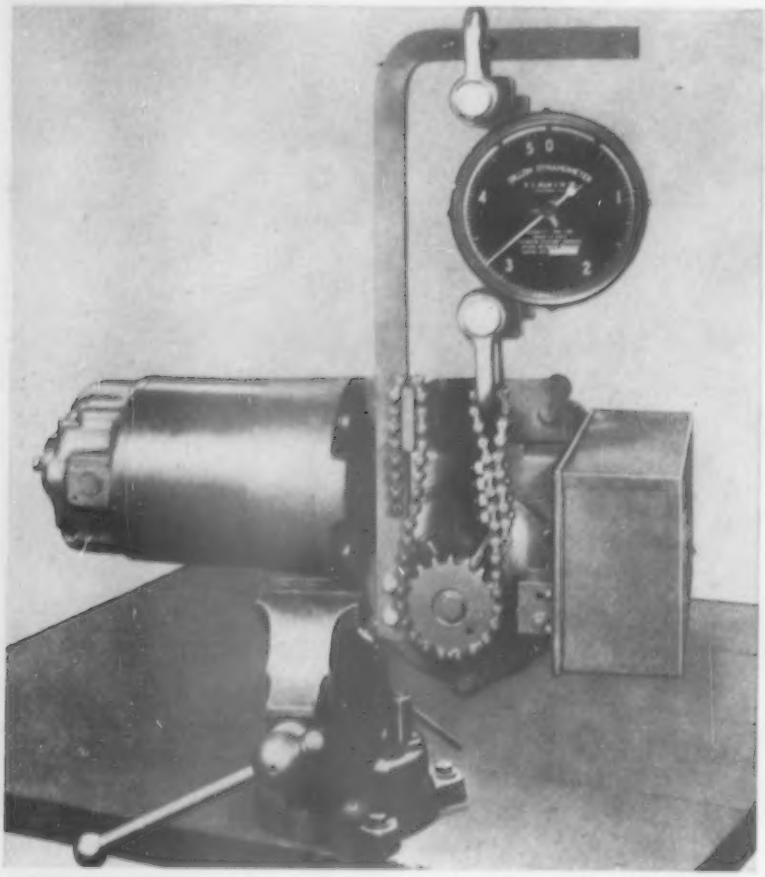
Call upon 3M research for the solution to your specific design or production problem. Call an expert, your nearest 3M Field Engineer—or write for further information to 3M, Dept. 31, 417 Piquette, Detroit 2, Mich.

ADHESIVES AND COATINGS DIVISION **MINNESOTA MINING AND MANUFACTURING COMPANY**

417 PIQUETTE AVE., DETROIT 2, MICH. • GENERAL SALES OFFICES: ST. PAUL 6, MINN. • EXPORT: 99 PARK AVE., N.Y. 16, N.Y. • CANADA: P.O. BOX 757, LONDON, ONT.

MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND-RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

By F. W. MICHAL, Electrical Editor, FACTORY



SIMPLE TEST installation enables engineers, quickly, to find out . . .

Will the Motor Handle the Load?

BIG PROBLEM at H. W. Crane Company, Chicago: checking torque of gear-reduction motors used in its power - operated overhead doors. Many of the installations are large, and company engineers must be sure the power units can handle the heavy loads without stalling.

Solution: this torque-test unit. Motor and gear-reduction housing are mounted as a unit in a vise. A sprocket is mounted on the drive shaft. An L-shaped angle iron is bolted on the gear-reduction housing to support a dynamometer. A roller chain is mounted as shown, with its other end held manually. When power is applied, torque developed is shown on dynamometer dial.

New Way to Get a Bad Shock

And in a place where you'd hardly expect it—in a manhole. As the National Safety Council tells it, a man was working in a manhole, applying concrete as a waterproofing. On a cold day, dry sand, moving through a rubber hose on a nearby machine, caused static electricity to build up. When the worker touched the machine he became frozen to it. While his injuries were not serious and he suffered no disability, this would appear to be a hazard that warrants attention. (The manufacturer of the machine involved specified that a bonded-type rubber hose be used, but at the time of the accident a common type was in use. A bonded hose was provided, and there has been no trouble since.)

Quick Look at Resistance Welding

The first cost of a resistance-welding outfit is a good deal higher than the first cost of an arc-welding unit. But it seems as though resistance welding is getting more and more attention these days. Particularly from companies that produce parts in big quantities. What's behind this trend? Here are some obvious advantages of the resistance-welding method, according to *Electrical Production*.

. . . *Resistance welders* can be operated by unskilled personnel. All operations are pre-set. All the operator has to do is position the parts, step on a foot pedal.

. . . *Contrary to common belief,* resistance welding is not limited to thin- and medium-gage metals. Sheet piles up to 6 inches thick have been resistance-welded.

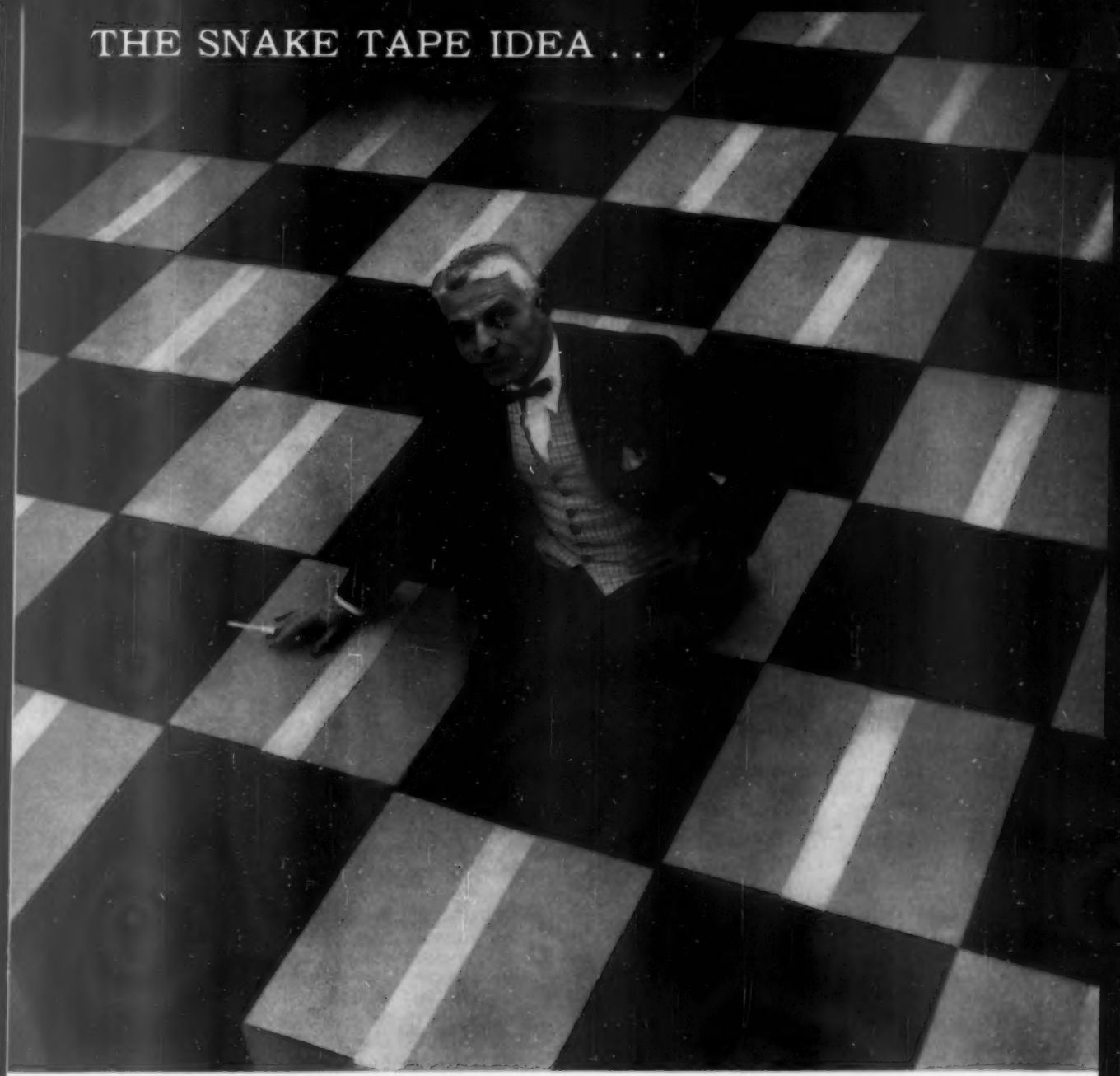
. . . *It can be used to join anything* from steel plates down to delicate control parts. And the list of weld materials is almost unlimited.

. . . *Resistance welding* gets the nod when it comes to fast operation —particularly important on those long-run jobs.

. . . *And cost per weld* is very low.

Interested in exploring the subject further? Then pick out a well-known equipment manufacturer to advise you; check with your power-company representative about power requirements. Pay particular attention to 3-phase welders if power factor is a problem at your shop.

THE SNAKE TAPE IDEA . . .



The Rule 41–Approved "TWO STRIP" method that . . .

seals cartons stronger in 1/3 the time !

You get a stronger closure because of the reinforcing yarns in Snake Tape. And being RAYON, those yarns absorb shock as no other reinforcing can. This means NO MORE DAMAGE CLAIMS due to tape failure when you seal cartons the fast way — using 2 strips instead of 6.

A generous sample of Snake Tape is yours to test at our expense! It is water-resistant, comes in various widths and in several ink colors for advertising your trade mark or firm name.

FREE SAMPLE: Write, ANGIER CORPORATION, Framingham 1, Mass., or use reply card opposite back cover.

FACTORY | CATALOG NEWS

To get these catalogs, circle item numbers on the Reader Service Card next to back cover.

MAINTENANCE

1—Piping Insulation. Subject of this 8-pager is "Foamglas," a cellular glass insulation for piping and similar equipment. Data on physical properties, sizes and shapes available, suggested thicknesses for –50 to 800 deg. F. Specs. FI-103. *Pittsburgh Corning Corp.*

2—Aluminum Busway Systems. Here's the story on a line of feeder and plug-in busways incorporating aluminum bus bars. Data on standards, ratings and dimensions, electrical characteristics, components, a multi-circuit system. 8 pages. GEA-6169. *General Electric Co.*

3—Paint Spray Booth Maintenance. Folder suggests three products for treatment of water used in water-washed paint spray booths; four for masking; two for stripping. Easy-to-read table lists information on properties, where and how to use. *Turco Products, Inc.*

4—Hydraulic-Setting Refractories. Booklet presents two types for temperatures through 3000 F.—"Firecrete" for casting special refractory shapes and "Blazecrete" for gunning and slap troweling applications. Tells how and where to use. 12 pages. *Johns-Manville.*

5—Pipe and Block Insulation. The whole story on "Alltemp," a product for all temperatures from 100 to 1600 F. Information on physical characteristics, shapes and sizes, uses, method of application, recommended thicknesses. 6 pages. *Philip Carey Mfg. Co.*

6—Tool Crib Control. How a control system will help you save seven ways is presented in this 6-page folder. Two basic systems: for control when detailed posting is *not* required; when detailed posting of withdrawals and returns *is* required. *Remington Rand, Inc.*

7—Fire Control. Closed circuit automatic fire alarm systems are described and illustrated in this 16-pager. Includes a fire sentinel, electric release, supervisory panel for automatic sprinkler or fire alarm systems, alarm boxes, door closers. *Derby Devices, Inc.*

8—Steam Cleaners. Heavy duty, high-pressure units that combine hydraulic pressure and thermal pressure are featured in this 6-page folder. Four-gun and two-gun models are shown, stationary and trailer-mounted. Specs and in-use photos. Catalog 500. *Malsbary Mfg. Co.*

9—Internal Telephone System. "Dial Your Way to Greater Business Success" discusses advantages of "P-A-X" system, a method for dialing inside calls independent of city telephone system and switchboard operator. 16 pages. Circular 1829. *Automatic Electric Sales Corp.*

10—Electric Heat. Slim-Jim booklet tells how to solve winter problems with "Chromalox" units—how to warm pipes and valves, prevent condensation, warm materials, melt snow and ice, heat rooms and buildings, handle other winter tasks. 16 pages. *Edwin L. Wiegand Co.*

11—Scaffolds. Bulletin PSS-34 presents the "Trouble Saver" system composed of sectional steel scaffolds, assembled without tools from prefabricated parts. Describes how it speeds erection and dismantling time. Application photos. 12 pages. *Patent Scaffolding Co.*

12—Air Handling and Sludge Equipment. Catalog of maker's industrial equipment (No. A-656) includes automatic sludge segregators and unloaders, filter air supply system, hydro-foam dust collectors and fog filters. Installation photos. 12 pages. *R. C. Mahon Co.*

13—Floor Machines and Vacuum Cleaners. Simplified guide aids selection of proper type and size for various jobs. Covers six floor machines with 11- to 22-in. diameter brushes and four vacuum cleaners. Discusses uses and type of operation of each. *Kent Co.*

14—Lighting Fixtures. A table in this bulletin compares maintenance costs of this line with others, based on 10-year service at 3000 hour yearly average. Another chart compares light output. Five types of fixtures for every need are pictured. Form 534. *Duro-Test Corp.*

15—Built-Up Roofs. Two booklets tell the complete story of two types of "Aquadam" roofs—slag-surfaced and smooth-surfaced asbestos. They discuss the many advantages of each type; present detailed specifications. 8 pages in each. BU79A, 80A. *Johns-Manville.*

16—Gears. Quick-reference folder contains photos and capsule descriptions of a complete line of gears, plus speed reducers, sprockets and chain, bearings, pillow blocks, ball bearings, couplings, and pulleys. Handy pocket size. Form 170-H. 16. *Boston Gear Works.*

17—Fork Trucks. Stand-up and sit-down models are presented in this 6-page folder. 12 attachments that increase their versatility and efficiency are illustrated. Five features that make operation safer, easier are photographed. Detailed specs and dimension drawings. Form TB-155. *Lamson Mobilift Corp.*

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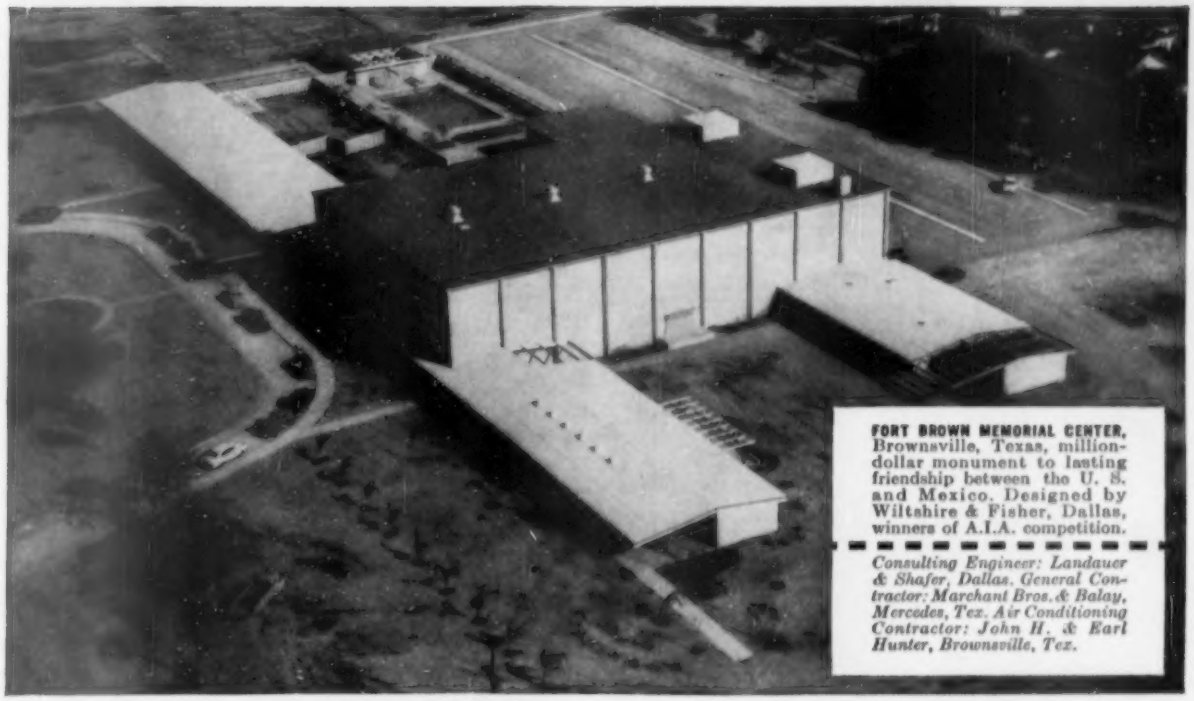


FORT BROWN MEMORIAL CENTER, Brownsville, Texas, million-dollar monument to lasting friendship between the U. S. and Mexico. Designed by Wiltshire & Fisher, Dallas, winners of A.I.A. competition.

Consulting Engineer: Landauer & Shafer, Dallas. General Contractor: Marchant Bros. & Balay, Mercedes, Tex. Air Conditioning Contractor: John H. & Earl Hunter, Brownsville, Tex.

IT'S AIRTEMP *AIR CONDITIONING IN PRIZE-WINNING FORT BROWN* memorial center

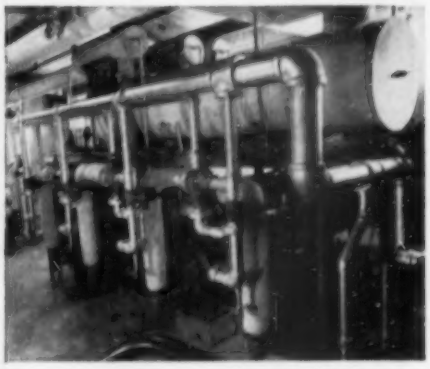
HERE'S MORE EVIDENCE OF TREND TO AIRTEMP AMONG LEADING U. S. ARCHITECTS!

Airtemp air conditioning is *famous* for trouble-free performance—just the smooth-running result you'd expect from 21 years of advanced engineering by Chrysler. And when you install Airtemp, you're giving your clients the best assurance of low operating costs—year after year.

Whether your job is large or small, in the complete Airtemp line of equipment for all systems of modern air conditioning, you will find the *exactly right* equipment for every requirement.

When you air condition with Airtemp you can make *doubly* sure that your installations are right in every detail by utilizing the advisory services of *top engineers* of Airtemp Construction Corporation. And to safeguard your installations through the years ahead, there are Airtemp-trained *personnel* and service *facilities* right on the spot in every major community.

So remember, next time you're planning commerical or industrial air conditioning . . . specify AIRTEMP. Get the best equipment for the job *plus* the complete air conditioning service that will relieve you of many problems.



250 TONS OF COOLING! Two Airtemp Liquid Chilling systems provide water for cooling cycle in air conditioning of Fort Brown Memorial Center. Heart of each unit is the Airtemp Variable-Capacity Radial Compressor with exclusive design which saves space, reduces compressor weight. Quiet operation is due to perfect balance and reduced vibration.

AIRTEMP BUILDS AIR CONDITIONING TO FIT ANY REQUIREMENT!

For full information on what Airtemp offers you, write to: Airtemp Construction Corporation, Dayton 1, Ohio

Airtemp
CONSTRUCTION CORPORATION
SUBSIDIARY OF CHRYSLER CORP.

AIR CONDITIONING • HEATING FOR HOMES, BUSINESS, INDUSTRY

DODGE PRODUCTS you should know

FLEXIDYNE
DRIVES & COUPLINGS

TORQUE-ARM
SPEED REDUCERS

DODGE-TIMKEN
PILLOW BLOCKS

DODGE BULLETINS YOU SHOULD HAVE

- Flexidyne Dry Fluid Drives and Couplings. Complete story and selection data. Bulletin A-640-A.
- Torque-Arm Speed Reducers. Technical data and selection methods on all 14 sizes—1 to 60 hp. Bulletin A-637.
- Rolling Bearings. Load ratings, dimensions and other data on Dodge-Timken and SC and SCM Ball Bearings. Bulletin A-638.

Write for your copies.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

FACTORY / CATALOG NEWS *Begins on page 138*

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

18—Portable Electric Tools. 74-pager includes buffers, vacuum cleaners, drills, grinders, hammers, polishers, refacers, sanders, saws, screw drivers, shears, tappers, etc. Photos and descriptions of many types and models. Form No. 1. *Black & Decker Mfg. Co.*

19—Flux Recovery Equipment. Sizes and types for every submerged arc welding installation are pictured in this 6-page folder. Discusses advantages—salvaging valuable flux, saving costly man-hours, speeding and improving welding. *Invincible Vacuum Cleaner Mfg. Co.*

20—Hoists and Chain Blocks. Four offerings: Bulletin 410 (16 pages) covers 1000- to 2000-lb. electric hoists; Bulletin 391-F, portable electric units. Bulletins 398-F (12 pages) and 415A review two series of aluminum chain block. *Manning, Maxwell & Moore, Inc.*

21—Mechanical Stirrups. Booklet tells how these electric- and air-powered units are more efficient, easier to handle than rope staging. Information on proper rigging. Photos of units at work on many jobs. Lists safety features. 8 pages. *Albina Engine & Machine Works.*

22—Signal Systems. Selection booklet features 3-dimensional illustration of plant layout with color-coded markers to indicate proper paging, danger, and/or general alarm system suitable for 31 different areas. includes selector wheel. 8 pages. *Federal Sign & Signal Corp.*

23—Materials Handling Equipment. Photo booklet shows many types solving various problems. Includes remote-controlled tractor trailer system, skid rack system with portable elevator for utilizing overhead space, dozens of others. 16 pages. Bulletin 552. *Barrett-Cravens Co.*

24—Electric Tools. Among types described and illustrated in Catalog No. 12 are drills, grinders, sanders, hammers, screw drivers, unishears, routers, power planes, saws, shapers, rubber cutters, etc. Many accessories. Detailed specs. 22 pages. *Stanley Electric Tools.*

25—Pre-Mixed Grout and Mortar. Two bulletins cover advantages and applications of two non-shrink, ready-to-use products (8 and 4 pages). Companion sheet illustrates 7-step method of repairing concrete floors with mortar. Forms EPMG-2, EPMM-2A, EPMM-4. *Master Builders Co.*

26—Vibration Control Machinery Mounts. Three "Here's How" sheets show how they solved vibration problems created by machine tools, punch press and shear, diesel and gas engine. Sheet on engineering background accompanies each. On-the-job photos. *Korfund Co.*

27—Painting. Bulletin presents six types of fast-spraying mill whites, with application directions for each. Companion sheet covers tinting pastes for interior finishes, addable to the mill white. Includes color chips of 7 colors, two shades of each color. *Arco Co.*

28—Portable Trash Burners. Here's the story on a packaged unit delivered in two sections for easy erection, same-day operation—inside or outside plant. Photos show typical three-step installation. Data on larger capacity stationary units. *Brule Incinerators.*

29—Wire Rope. For those tough jobs where extra strength is needed, you'll want to consult this bulletin on "Powersteel." Tells how it's stronger, lasts longer, lowers cost. Photos show application in heavy-duty jobs. Sizes and specs. *Broderick & Bascom Rope Co.*

30—Power Sweeper. Catalog IS-101 features "Hydra-Sweep"; discusses ease of handling, convenient controls, low cost, rugged construction, and simplified servicing. Lists features and detailed specifications. Includes photos of unit on the job solving six sweeping problems. *Industrial Sweeper Co.*

Turn to page 228

TAPER-LOCK

A PATENTED PRODUCT OF DODGE

—OFF THE SHELF

NO REBORING!
NO KEYSEATING!
NO MACHINING!

Ready for the shaft, with no costly, time-consuming operations to make them fit. That's the big news about Dodge Taper-Lock Sprockets. Taper-Lock grips the shaft with the firmness of a shrunk-on fit, yet comes off easily. Bushings may be re-used. They come in sizes to meet most every application.

Taper-Lock Sprockets are available from Distributors' stocks in a complete range of B-type steel sprockets —½" to 2" pitch. Dodge quality Roller Chain is packaged in 10-foot lengths—also available in 50-foot and 100-foot reels. Save time—save money—keep production rolling—get Dodge Taper-Lock Sprockets and Roller Chain from your Dodge Distributor.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor, for valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

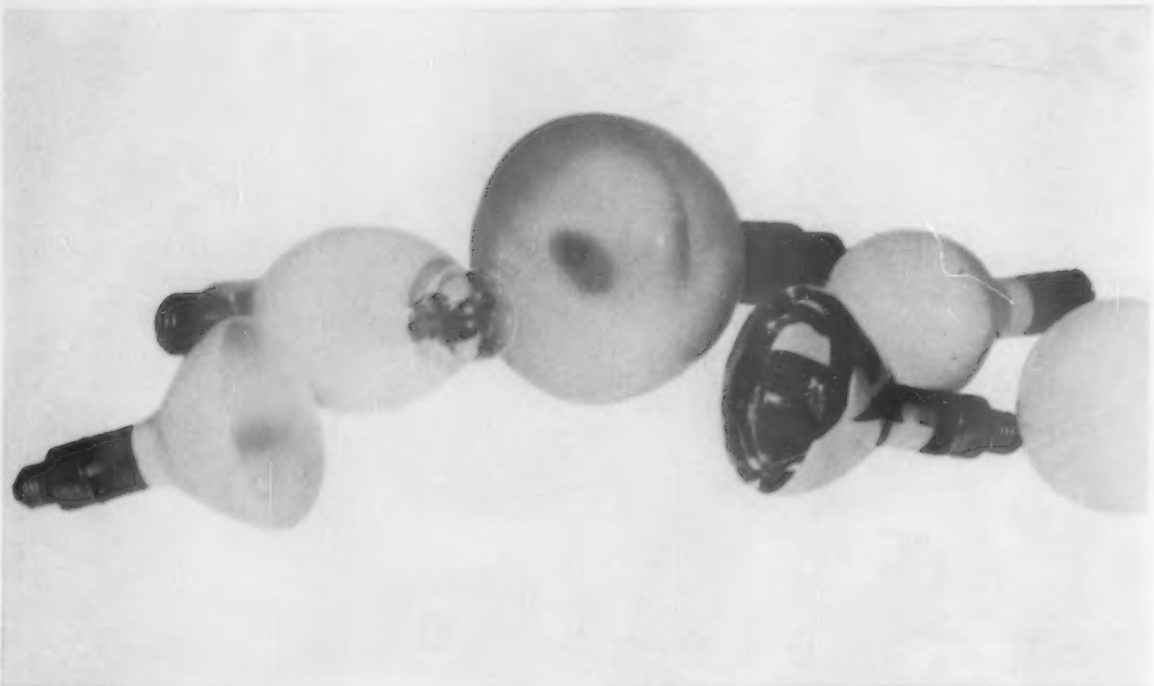
THERE'S ONLY ONE TAPER-LOCK, THE BUSHING THAT MOUNTS FLUSH!

Standardize, economize with Taper-Lock, the bushing that is interchangeable in Dodge sprockets, sheaves, couplings and conveyor pulleys. *More than 2,000,000 in use!*

DODGE

of Mishawaka, Ind.

For more about these products, circle item numbers on Reader Service Card next to back cover.



FLUOMERIC LAMPS are made in several sizes and shapes, some pictured here. Range from 250 to 750 watts (a 100-watt lamp will soon be available). Self-contained bulbs need no external attachments; screw into ordinary electric sockets.

Light Like Sunlight

Combines best features of incandescent, fluorescent, and mercury-vapor lamps; eliminates negative ones.

You can say good-bye to harsh, unnatural light with the Fluomeric lamp. It combines yellow-red tone of incandescents and blue-green hue of mercury-vapors, with flexibility of fluorescent phosphors to produce natural, sunlike glow. Yet it's bright enough for high bay installations, or anywhere in the plant where good lighting is needed. Produces 25 lumens per watt compared to 18 for incandescents. Emits light three ways: by gaseous discharge, as in a quartz mercury-vapor lamp; by fluorescing of activated phosphor powders, as in a fluorescent lamp; by tungsten filament, as in an incandescent lamp. However, it needs no bulky transformer—heavier and more costly than the lamp itself—required for mercury-vapor and fluorescent lamps. Rated life is 12,000 hours, compared to 750 for incandescents.

Duro-Test Corp. (Circle No. 1, Reader Service Card.)

For news about another lighting development, turn the page

OTHER EQUIPMENT

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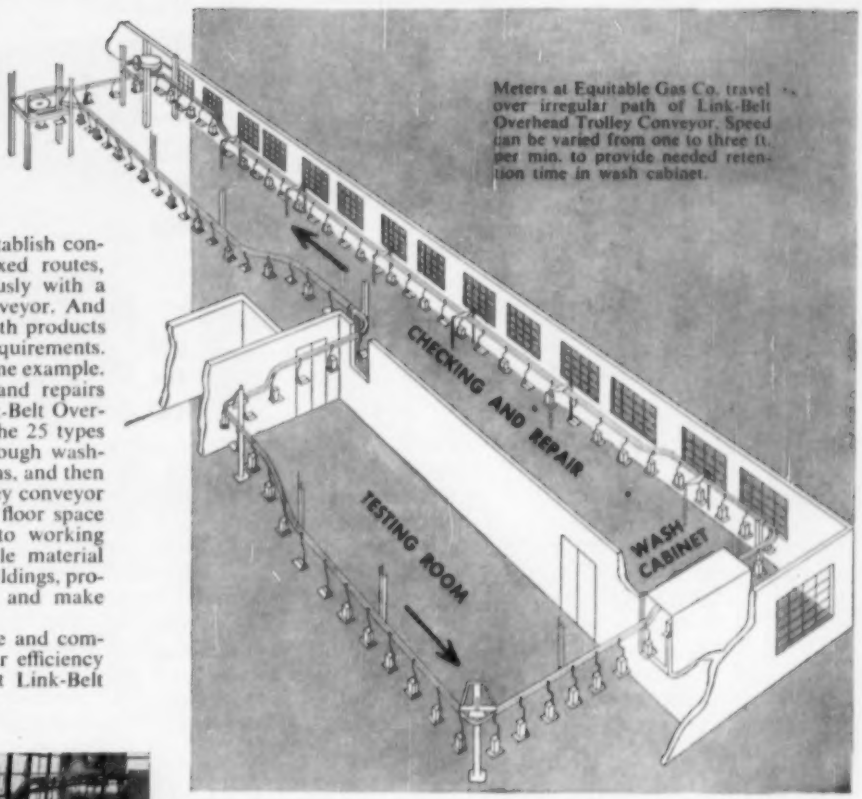
This LINK-BELT Overhead Trolley Conveyor

adjusts to varying products and process requirements

Inspection and repair of 25 sizes and types of meters coordinated at Equitable Gas Co., Pittsburgh, Pa.



Meters at Equitable Gas Co. travel over irregular path of Link-Belt Overhead Trolley Conveyor. Speed can be varied from one to three ft. per min. to provide needed retention time in wash cabinet.

WHEREVER it's possible to establish continuous handling along fixed routes, you can reduce costs tremendously with a Link-Belt Overhead Trolley Conveyor. And its flexibility permits use even with products of diverse size and processing requirements.

Equitable Gas Co. provides a fine example. This Pittsburgh utility inspects and repairs 30,000 gas meters annually. Link-Belt Overhead Trolley Conveyor handles the 25 types and sizes from testing room, through washing, checking and repair operations, and then back to testing area. With a trolley conveyor you put ceilings to work — save floor space with conveyor dropping down to working area only where required, handle material continuously between floors or buildings, provide better working conditions, and make more effective use of manpower.

Link-Belt conveying experience and complete equipment can bring similar efficiency to your plant. Call your nearest Link-Belt office or write for Book No. 2330.

Workman checks valve action before passing meter to repair station. Low elevation of conveyor allows unrestricted entrance of light through windows.

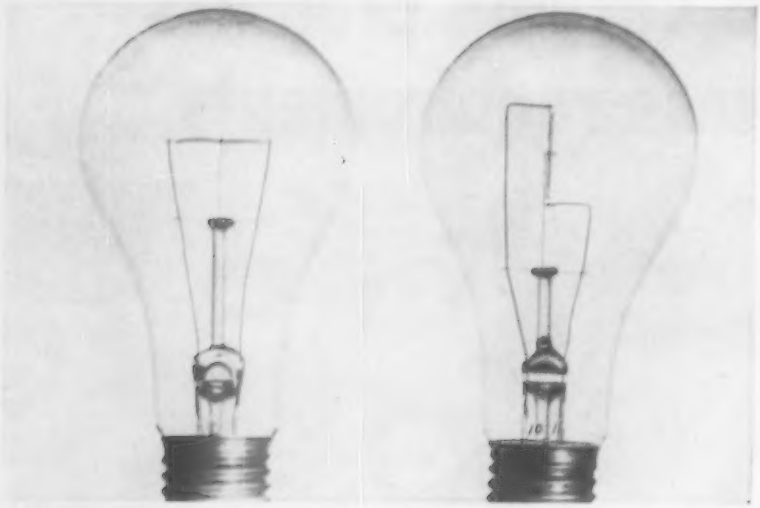
The New Link-Belt Ball Bearing Trolley. Ask for Book 2536.

Meters en route to washing and degreasing cabinet. Wire mesh bottom carriers assures spray effectively reaching bottom and sides of meters.

LINK-BELT

IN-THE-FLOOR AND OVERHEAD TRUKVEYORS
OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.898



BEFORE AND NOW. Right bulb shows coiled-coil filament mounted lengthwise. Produces 15% more light than old model, but requires no more electricity.

Incandescent Lamp Gives More Light

Increased light output is achieved by improving tungsten filament with basic design changes; altering mount structure so filament is positioned lengthwise or axially in bulb; substituting coiled-coil filaments in lamps of 300 watts and larger for the first time. Axial positioning permits filament to burn at higher temperatures (producing more light) without shortening operation life; causes bulb blackening to concentrate in smaller area (mostly in the neck), permitting more light to get out. Available in 750- and 1000-watt sizes, which offer greatest benefits. The 750-watt bulb, for example, produces 21.6 lumens compared to 18.9 in old style. Smaller sizes will be made in the next few years.

General Electric Co. (Circle No. 2, Reader Service Card.)

3—Welded Aluminum Chain has working load limit that's 60% that of welded steel chain, yet weighs 65% less. It's lightweight, non-sparking and non-magnetic; resists corrosion; requires little or no maintenance. Sizes: ¼, ⅜, ⅜, ½ in. *McKay Co.*

4—Corrosion Control Method combines cathodic protection with chemical treatment. Treatment reduces initial installation cost and operating expense of cathodic protection; assures better, more consistent distribution of protective current. *Electro Rust-Proofing Corp.*

5—Do-It-Yourself Thermocouples enable quick and easy assembly of connectors from standard interchangeable parts to meet every requirement. Include one-piece plug inserts, jack inserts in plastic housing or multiple connection panel, in four alloys. *Marlin Mfg. Corp.*

6—Pre-Enigneered Conveyors are easy to install. Light-duty wheel gravity, medium- and heavy-duty roller gravity sections are offered. Components include center drive, take-up unit, unit boosters, curves, tail-end take-ups, and a variety of supports. *Lamson Corp.*

7—Spot-Check X-ray for weld inspection weighs only 46 lb., yet provides power pentration of 140 kvp. "Baltospot" has capacity of 1½ in. steel or equivalent. May be used in place of or as alternative to sectioning methods of inspection. *Balteau Electric Corp.*

8—Radiation Dosimeter is a pen-size instrument that detects and gives visible warning of dangerous exposure to radiation. Simple to use, self-contained; charges and recharges by shaking. Provides cumulative measurement and instantaneous reading. *Electromation Co.*

9—Safety Floodlight, explosion-proof, is powered by compressed air turbo-generators, cooled by exhaust air. The 150-watt, 12-volt light is ideal where electric power is not readily available, or for emergency use. *Copco Eastern Ltd.*

Turn the page

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YOUR LYON
Dealer for

LYON®
STEEL EQUIPMENT

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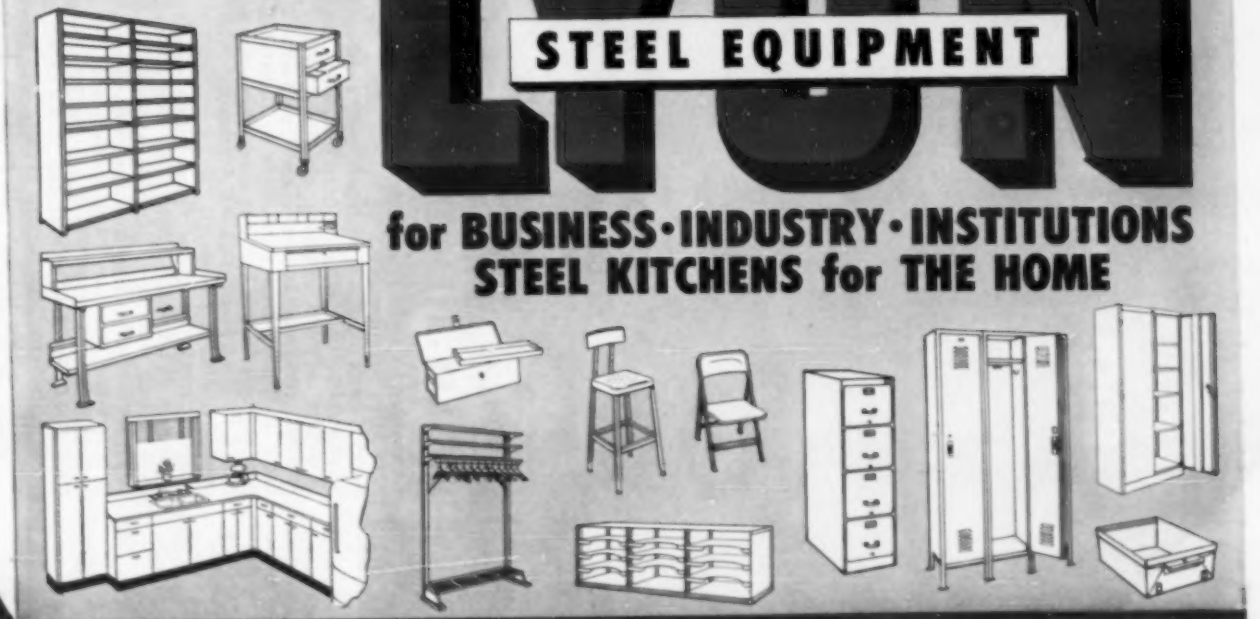
STEEL KITCHENS for THE HOME



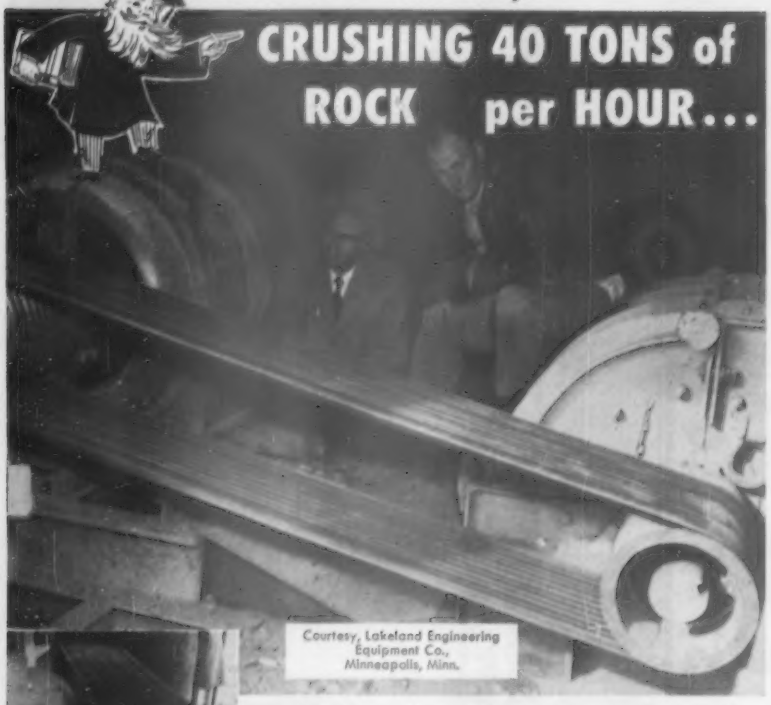
LYON METAL
PRODUCTS, INC.

General Offices: 112 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities

A PARTIAL LIST OF LYON STANDARD PRODUCTS

- Shelving
- Lockers
- Stools
- Bin Units
- Kitchen Cabinets
- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- Chests and Safes
- Display Equipment
- Toolroom Equipment
- Wood Working Benches
- Flat Drawer Files
- Revolving Bins
- Filing Cabinets
- Hanging Cabinets
- Folding Chairs
- Coat Racks
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

The Little Professor says:



This vertically balanced set of 12 Durkee-Atwood heavy-duty V-belts at the Ochs Plant, is typical of Durkee-Atwood matched belt installations. D-A belts are matched vertically . . . there's no "sag" error . . . each belt is tested individually . . . that's why D-A guarantees matchability.

Calls for rugged, Power Balanced DURKEE-ATWOOD V-BELTS!

Demanded by Ochs Brick and Tile Company of New Ulm, Minnesota is long belt life from the multi V-belts used in their heavy-duty crusher. That's why their plant superintendent, Don Schrepfer (at right in photo) selected Durkee-Atwood vertically balanced and matched V-belts . . . to keep brick production at 25,000,000 per year . . . serving building needs throughout North Dakota, South Dakota, Minnesota, Wisconsin, Illinois and Iowa.

Mr. Schrepfer's supplier, Oscar Ulrich (at left in photo), of Lakeland Engineering Equipment Co., Minneapolis, says: "Durkee-Atwood's dependable factory engineering service enables us to guarantee superior V-belt performance for our customers."

CALL ON DURKEE-ATWOOD. Let D-A's experienced distributor and factory experts help you with your power transmission problems. Find out today about this valuable service to industry . . . no obligation!

FREE! Send for your free copy of "Handy Tips on V-belts and V-drives."

See your D-A distributor or write Dept. FM-1 for catalog that includes conversion tables, engineering data, latest Rubber Manufacturers Association horsepower ratings, drive selections and helpful Do's and Don'ts of V-belt operation.

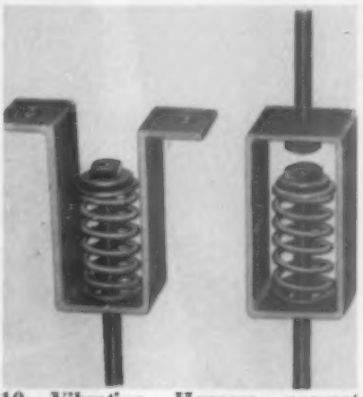
DURKEE-ATWOOD COMPANY
MINNEAPOLIS 13, MINNESOTA

DURKEE ATWOOD V-BELTS

FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

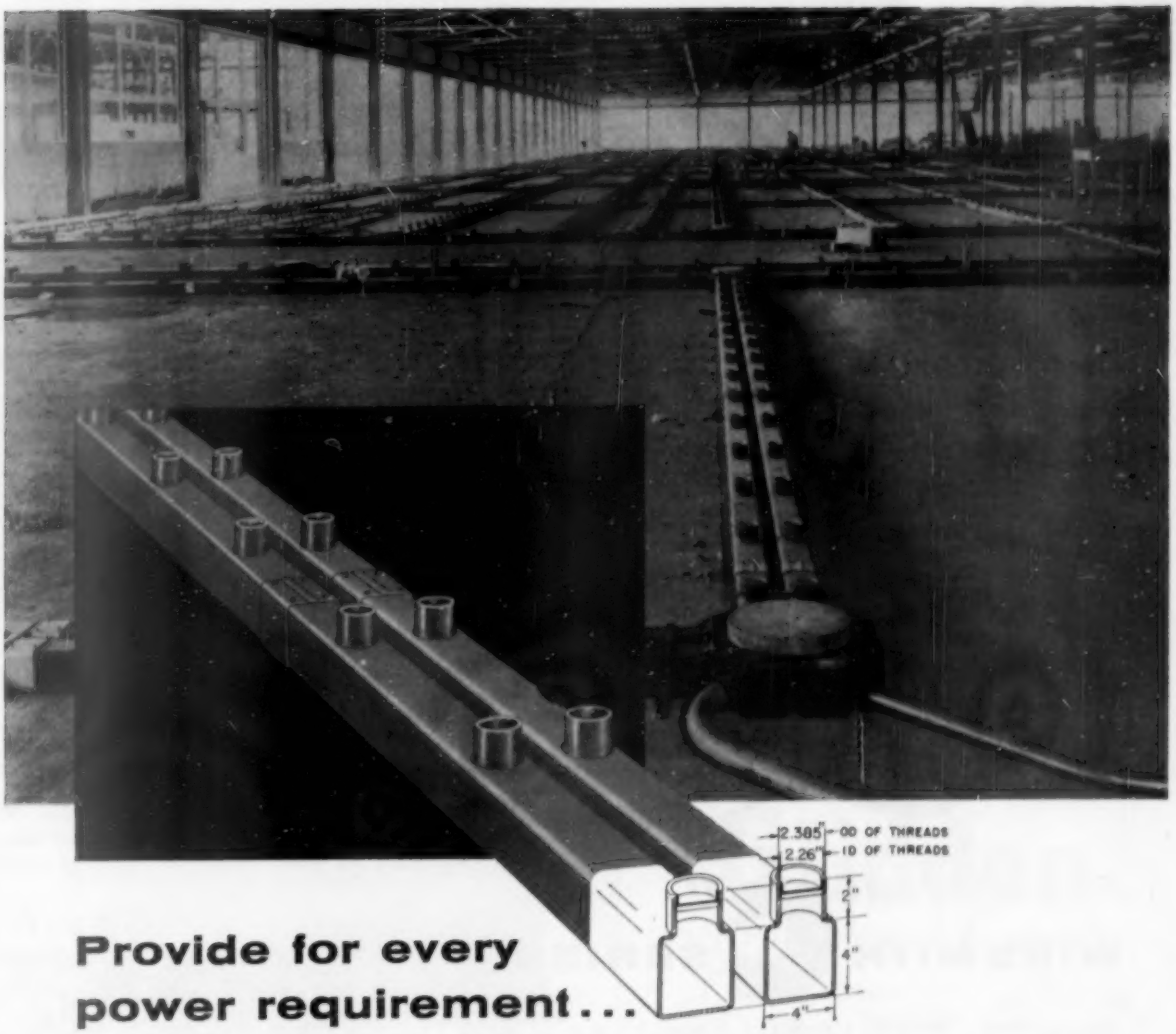


10—Vibration Hangers prevent transmission of noise and vibration from suspended equipment; support piping systems flexibly. Deflect thermal expansion of pipelines; for use where high and low temperatures are involved, low disturbing frequencies. *T. R. Finn & Co.*

11—Magnetic Chute is for gravity flow of ground or finely crushed products. Zig-zag unit removes not only occasional nut or bolt, but fine slivers of metal that wear off processing machinery. 8-48 in. wide; carbon or stainless steel. *Prater Pulverizer Co.*

12—Centrifugal Pump handles liquids containing high concentrations of solids, air, and gases. Diverging-type impeller has greater area at discharge than inlet—prevents vapor binding, avoids clogging, makes pump self-venting, self-regulating. *Ingersoll-Rand Co.*

Turn the page



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INDUSTRIAL UNDERFLOOR ELECTRICAL RACEWAYS

Versatile in design, National Electric Jumboduct offers plenty of capacity for production line wiring . . . eliminates the hazard of overhead wiring . . . permits flexible, attractive plant layouts by providing for readily accessible electrical distribution in the floor at a minimum cost.

A Jumboduct system in your plant means:

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4" x 4" Cross Section—more room for wires

Efficient power distribution

2" pipe threaded outlets every 24" permits exact location of equipment

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- Easy-to-handle 10' lengths
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- Coated with a baked-on acid-resisting enamel
- A completely grounded all-steel system

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National Electric Products

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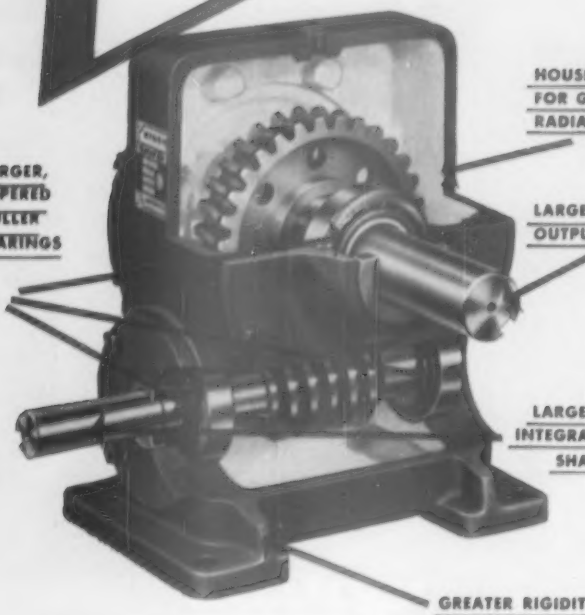
3 Plants • 10 Warehouses • 36 Sales Offices

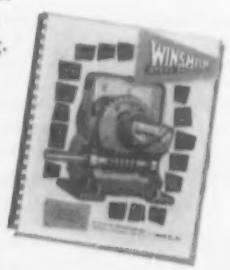
7 CHECK POINTS of Speed Reducer Design


HOUSING DESIGNED FOR GREATER HEAT RADIATING CAPACITY
LARGER, TAPERED ROLLER BEARINGS
LARGER, STRONGER OUTPUT SHAFTS
LARGER STRONGER, INTEGRAL WORM SHAFTS
GREATER RIGIDITY

...on the New "C" WINSMITH SERIES

THESE 5 IMPROVED FEATURES of Winsmith's new "C" Series reducers mean greater performance, greater stamina, greater dependability...*greater value for your horsepower dollar.*

In all, 108 models comprised of single and double reduction units are available in the "C" Series...a unit to answer every speed reducer need. Compare our *increased* rated horsepower and torque output with reducers of competitive makes. For complete data on the "C" Series, write for catalog.



WINSMITH SPEED REDUCERS

NEW CATALOG! Describes the complete "C" Series plus other units in the Winsmith line. Contains drawings, dimensions, weights and ratings for each model described. Write today for Catalog No. 155—on company letterhead, please.

WINSMITH, INC. 117 Eaton St., Springville, (Erie County), N.Y.

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

13—Storage Rack made of "Live Rails" provides first-in, first-out storage of boxed or palletized loads, tote pans, etc. Assembly is simple; length, width, and height can be varied to suit. Rails have two rows of wheels; serve two lanes at once. *Alvey-Ferguson Co.*

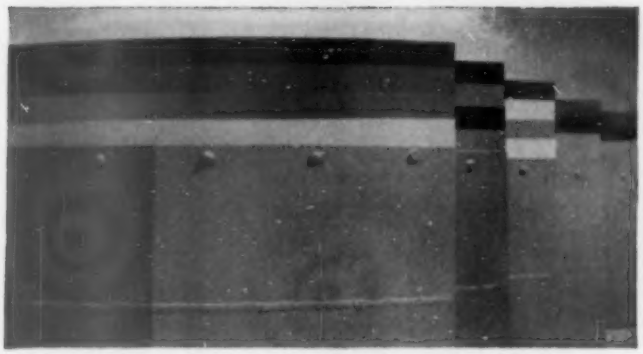
14—Ball-Bearing Tester uses inertia to indicate torque, eliminating need for complex sensing elements. "Mass Accelerator" meets laboratory requirements, is easy to operate at workbench or table. Handles bearings 0.1875-1.500 in. OD. *Control Instrument Co.*

15—Rinse Tank Controller limits amount of water used in electroplating, effecting water savings. Automatically turns on water valve only if water is contaminated; turns off valve moment collected water in tank is sufficiently clean. *Industrial Instruments, Inc.*

Turn the page

NOW AVAILABLE FROM GLIDDEN: Job-tested, anti-corrosive

PAINT FINISHING SYSTEMS



Typical Paint Finishing Systems: Here are a few of the Glidden Finishing Systems showing the step-by-step application of primers, intermediate and finishing coats. Glidden has a field-tested finishing system that will give you maximum protection against any corrosive or climatic condition.

New Glidden job-tested finishing systems offer you the most durable, anti-corrosive protection ever available. A special system has been developed for every type of corrosion problem and every climatic condition. Two developments make this possible.

1. New highly anti-corrosive finishes. These finishing systems utilize the new Vinyls and NU-PON (epoxy) coatings. They have excellent chemical resistance and are outstanding for hardness, toughness and adhesion.

2. Field-tested finishing systems. These systems take the guesswork out of buying anti-corrosive finishes. They provide you with the right number of coats and the right finishes for every condition. You don't have to use four or five coats when two will do, and you don't have to use expensive anti-corrosive paints when they are not required.

New Formula NEV-A-RUST dries to a sparkling, high gloss; has greater resistance to rust, acid, gases, fumes. Ideal for structural steel, iron fences, grillwork, smokestacks, metal roofs and all metal surfaces.

Glidden

Professional Finishes

The Glidden Company
Maintenance Finishes Division
Cleveland 2, Ohio

New catalog includes complete specifications and product guide, selector charts, color chips, information on special finishes of all types—this book is a *must* for reference; training of personnel; purchasing guide.

HAVE GLIDDEN GIVE YOU A NO-COST, NO-OBLIGATION,

PAINTING ANALYSIS OF YOUR PLANT NEEDS

Fill in and mail to The Glidden Co., Dept. FM-156 11001 Madison Ave., Cleveland 2, Ohio

I am interested in complete details of

- ☐ Glidden Finishing Systems
- ☐ Glidden Painting Analysis
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- ☐ NU-PON (epoxy) coatings
- ☐ New Glidden Maintenance Products Catalog

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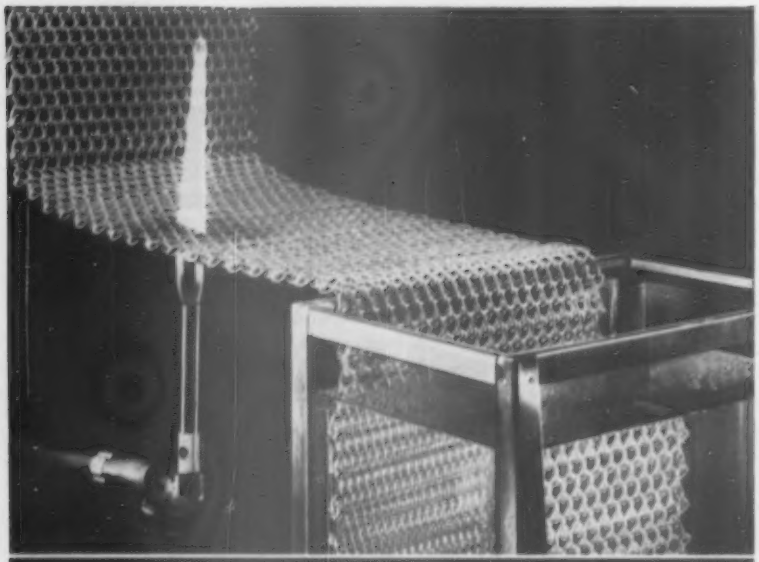
Company _____

Address _____

City _____ **Zone** _____ **State** _____



HEATPROOF! RUSTPROOF!

Cambridge

WOVEN WIRE CONVEYOR BELTS

permit continuous heating, quenching, washing

All-metal belt . . . corrosion resistant and impervious to damage at temperatures up to 2100° F . . . withstands most severe conditions of annealing, tempering, brazing, as well as quenching, pickling, washing. Moving belt eliminates batch handling, cuts costs, provides continuous production.

Cambridge Woven Wire Conveyor Belts have no seams, lacers or fasteners to wear more rapidly than the body of the belt . . . no localized weakening. Open mesh construction lets heat and gases circulate freely all around the work, and permits free drainage of process solutions.

No matter how you look at it, CAMBRIDGE Woven Wire Conveyor Belts are invaluable aids to AUTOMATION . . . eliminate profit-stealing batch and hand operations. They are made in any size, mesh or weave, and from any metal or alloy. Special raised edges or cross-mounted flights to hold your product during movement are available.

CONTINUOUS QUENCHING—of small or large parts on a Cambridge belt is faster and cheaper.

Call in your Cambridge Field Engineer to discuss how you can cut heat treating costs by continuous operation. You can rely on his advice. Write direct or look under "BELTING, Mechanical" in your classified phone book.

ASK FOR FREE 130-PAGE REFERENCE MANUAL illustrating and describing woven wire conveyor belts. Gives mesh specifications, design information and metallurgical data.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

DEPARTMENT E, CAMBRIDGE 1, MARYLAND

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

FACTORY / EQUIPMENT NEWS
Begins on page 142

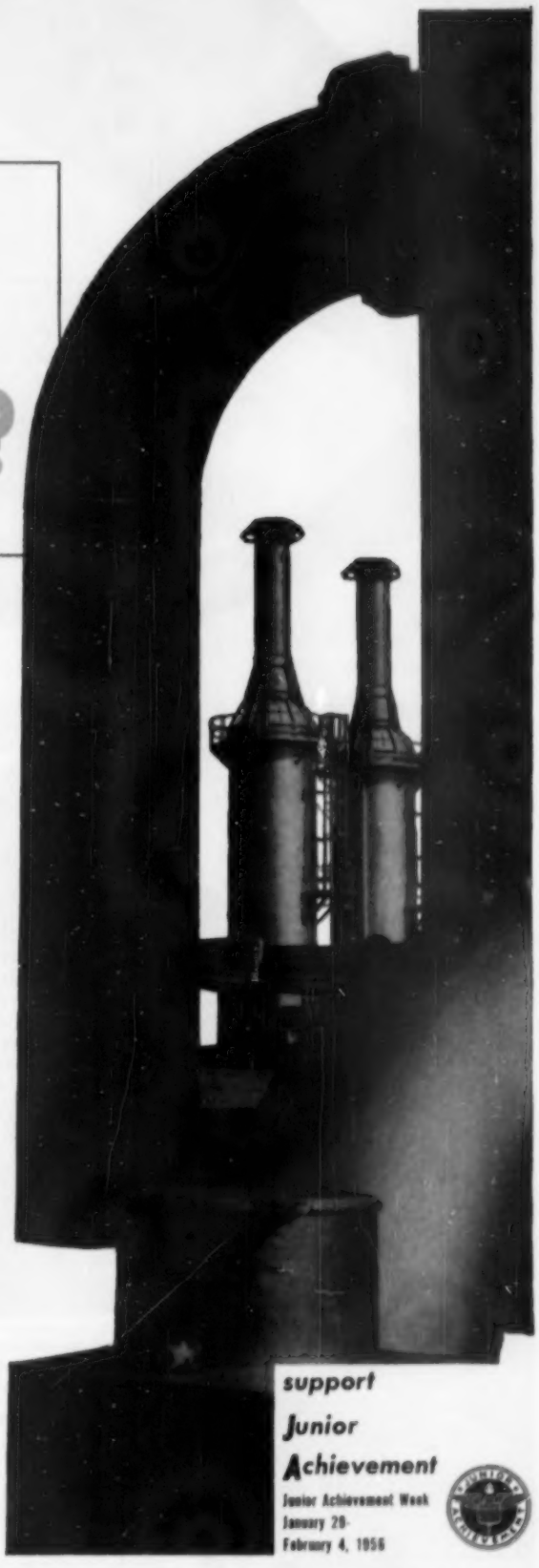
For more about these products, circle item numbers on Reader Service card next to back cover.

16—Waterless Skin Cleanser is packaged in 5-oz. polyethylene tube. Soft tube will not dent, corrode, break, or crack—good news for worker who keeps supply in tool box. SBS-30 removes stubborn soils, including grime, grease, tar, paint, ink. *Sugar Beet Products Co.*

17—Burner Control System is for oil, gas, combination oil/gas burners. "Fireye AC" combines in one panel flame failure safe-guard, programing control, short-circuit protection, motor starters, fuel selector switches, signals, alarms. *Electronics Corp. of America.*

Turn the page

What's new in PETROLEUM?



There's a lot that's new to you in petroleum if you haven't kept pace with recent developments. For improvements come so rapidly in this progressive industry that it's difficult to keep abreast of them.

Improved motor oils, cleaner burning fuels, more effective rust preventives—these are a few of the developments that may find profitable application in your plant or business enterprise.

One man who keeps abreast of developments in petroleum science is the Gulf Sales Engineer. This trained specialist can help you find opportunities for important savings in operating and maintenance costs through the use of the most suitable fuels, lubricants, solvents, waxes, and process oils.

Why not get in touch with a Gulf Sales Engineer today? Consult the telephone directory for the number of your nearest Gulf office. Gulf Oil Corporation · Gulf Refining Company, 1822 Gulf Building, Pittsburgh 30, Pa.

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THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

Clean ...Motors and Generators...Quickly, Efficiently, Safely with TURCO-SOLV

- **Far More Efficient** than stoddard solvent
- **Far Less Toxic** than carbon tetrachloride
- **Far Safer** than gasoline

Also ideal for a host of other plant maintenance cleaning jobs

Since the introduction of Turco-Solv three years ago, hundreds of industrial concerns have purchased and used this material for electrical equipment and plant maintenance cleaning. A true detergent action safety solvent, only Turco-Solv offers you an unchallenged combination of user benefits . . . safety, efficiency, speed and versatility.

It is from a continuous program of laboratory research, testing and development that comes the constant improvement of existing Turco materials, and the certainty that Turco will develop new products, as they are needed, through the tomorrows that lie ahead.

TURCO

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Chemical Processing Compounds
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Write for Booklet
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FREE!
Valuable booklet discusses all methods of cleaning electrical equipment and gives advantages of each

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TITLE _____

F

FACTORY / EQUIPMENT NEWS
Begins on page 142

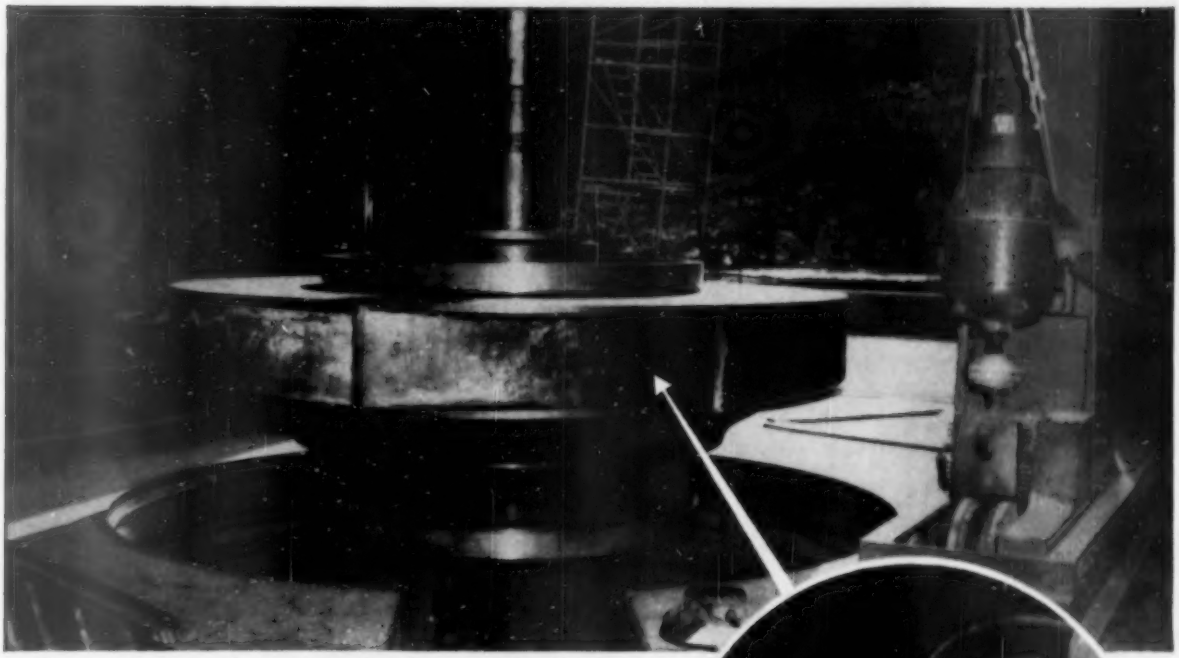
For more about these products, circle item numbers on Reader Service card next to back cover.

18—Numerical Sequence Programmer increases versatility of maker's lathes. Various operations can be pre-set on electronic control panels—up to five automatic work cycles, using as many as five different spindle speeds, five feed rates. *Monarch Machine Tool Co.*

19—Crane Conductors used on maker's cranes are now offered for all makes. Aluminum units are for heavy duty—300, 500, 1000 amp. and larger. Maintain positive contact, regardless of bar irregularities. Side- or overhead-mounted. *Cleveland Crane & Engineering Co.*

20—Fork Lift Truck speeds lifting, transporting, and stacking of heavy, bulky materials. Handles loads to 5000 lb. Operates over smooth or rough, paved or unpaved areas. High underclearance (11 in.) permits yard handling in all seasons. *Piper and Paine.*

Turn the page



Sigma welding has made the repair of these large pump impellers faster and more economical. Finished welds are a sound, homogeneous bond.

Sigma Welding Saves $5,000 per unit

Speeds repair of world's second largest pumps . . .

During operation, giant 20 ton manganese bronze pump impellers like this one, suffer cracks ranging in size from small sand inclusions, to cuts over a foot long. By using sigma welding, it is now possible to make high quality, on the spot repairs without disassembling the units — this results in an immediate savings of 5,000 dollars per pump.

Shown above is a typical repair operation on one of the 22,000 hp. electric motor driven pumps. This crack is 11-in. long, 2½-in. wide, and 2-in. deep. The four pegs adjacent to the crack are strain check points. Frequent measurements made of the distance between them determines welding duration and the peening sequence necessary to control distortion which in this operation was less than 0.005 inch. The completed weld made with aluminum bronze wire has an excellent surface appearance and color match.

You can speed production and cut costs in your operations—find out more about sigma welding from your local LINDE representative . . . Start saving now, call him today.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

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Linde
Trade-Mark

Farquhar's "Roll-Free" Gravity Conveyors speed production loading at the York Container Company.

Farquhar Car Unloader coupled with Farquhar Power Belt Conveyors move bulk materials from the hopper car directly into this large industrial plant.

move it the easy way
with FARQUHAR Conveyors

DON'T pay high costs for involved complete-system conveyor installations. Move your materials the Farquhar way with a planned system using standard conveyors and components linked together.

Take, for instance, Farquhar's "Roll-Free" Gravity Conveyors that put "free" gravity to work for you. These light-weight, strong, easily installed conveyors make light work of moving unit loads.

Then there's Farquhar's modern Car Unloader and Power Conveyors that carry sand, coal, gravel and other materials directly from the hopper car to the material stand inside the plant.

Standard Farquhar Power Belt and Gravity Conveyors, installed singly or in multiple units, are the easiest, low cost way to move materials . . . bulk or packaged. Farquhar sales engineers will be glad to help you develop a conveyor layout to meet your particular requirements.

Get the facts now . . . use this convenient coupon.

OLIVER Farquhar CONVEYORS
POWER BELT AND GRAVITY CONVEYORS

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Bulk Conveyors—☐
Name:
Company:
Address:

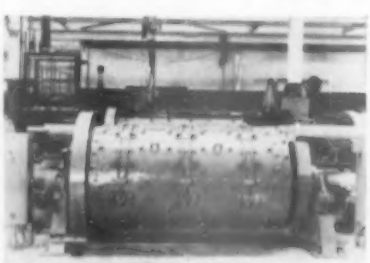
FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

21—Encapsulated Transformers are for Class H temperatures in military applications; industrial applications requiring protection against grease, oil, corrosive atmospheres. They use a durable elastomer formulation, a modified epoxy resin, etc. *General Electric Co.*

22—Shower Control protects against injuries due to sudden pressure and temperature change. Failure of either hot or cold water supply instantly shuts off shower. Installed with concealed or exposed piping; has only one hole for valves. *Powers Regulator Co.*



23—Tumbling Mill operates 90% quieter than others, says maker. Accomplished by sound-deadener of ¾-in. thick neoprene rubber fastened to inside of shell, and precision-machined, semi-steel gears and pinions. Can be applied to mills now in use. *W. W. Sly Mfg. Co.*

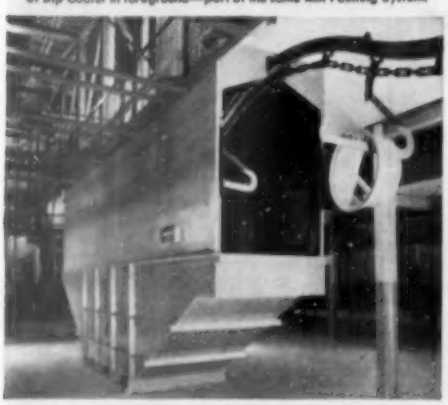
Turn the page

COMPLETE *Finishing* SYSTEMS

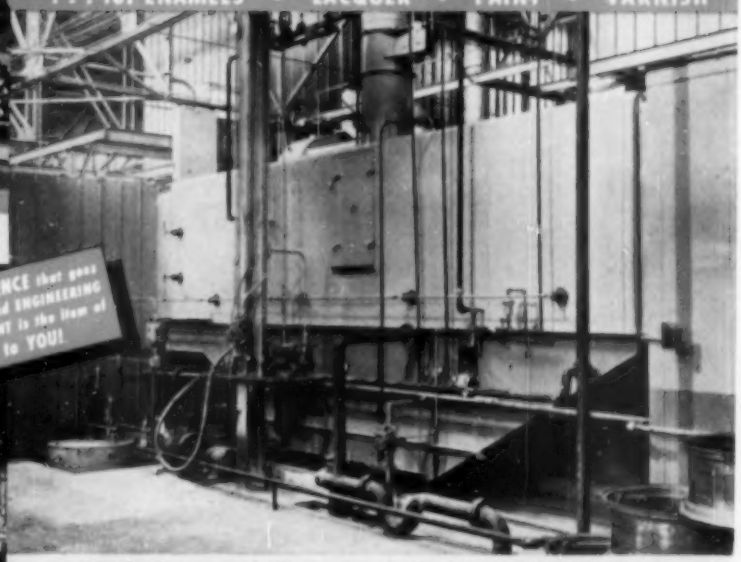
. . . for ENAMELS • LACQUER • PAINT • VARNISH

Mahon Six-Stage Metal Cleaning and Rust Proofing Machine—part of a Complete Mahon System for Painting Truck Wheel Rims.

Mahon Overhead Finish Baking Oven with Drip Enclosure and end of Dip Coater in foreground—part of the same Rim Painting System.



Mahon Dip Cooling Unit designed to expedite cooling of Rims emerging from Finish Baking Oven to handling temperature.



Mahon Dip Coater—part of a Complete Mahon Finishing System for Painting Truck Wheel Rims. Paint Mixer and other facilities are provided to maintain Epon Paint at constant temperature.

Complete Mahon DIP COATING System Finishes Truck Wheel RIMS at MINIMUM COST!

Illustrated here are major units of processing equipment which, with other facilities, make up a Complete Mahon Finishing System designed especially for coating truck wheel rims with Epon Paint. The system includes a Six-Stage Metal Cleaning and Rust Proofing Machine, Cooling Tunnel, Dip Coater, Ventilated Drip Enclosures, Filtered Air Supply System, an Overhead Finish Baking Oven and a Dip Cooler. This is another typical Mahon solution for a manufacturer with a particular finishing job . . . it produces a fine finish in minimum time with a minimum of attention, and at an absolute minimum cost per unit painted. If you have a finishing problem, or are contemplating new finishing equipment, you, too, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified also, to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. Whether you require a Complete Finishing System for Spray Painting—either Manual or Electrostatic, Flow Coating or Dip Coating, you will find, if you investigate, that Mahon equipment will serve you better . . . because, Mahon equipment is engineered better and built better for more economical operation over a longer period of time. You can rely on Mahon to do the complete job on one contract—undivided responsibility for the entire system insures proper coordination and safeguards you against complications which may upset your production plans and subsequent schedules. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-656.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

❶ Proven, Westinghouse-manufactured, extended surface heating coils good for continuous operation up to 200 psig.

❷ Die-formed casings with rounded corners eliminate accidents and dirt catching pockets. Front and back panels easily removable.

❸ Multiple louvered outlets for efficient distribution of heated air.

❹ Self-aligning, grease-lubricated ball bearings mounted outside casing readily serviceable.

❺ Face and by-pass dampers permit continuous air circulation to maintain uniform temperatures.

NOTE: Louver-type mixing box accessory permits introduction of fresh air for make-up and ventilation, with or without filters.

Westinghouse...The Unit Heater for General Purpose and Heavy Duty Industrial Heating

★ These rugged units available in 24 sizes, 8 coil selections, 150 ratings—from 100,000 to 2,500,000 BTU/hr., capacities from 2000 to 25,000 CFM each.

★ GENERAL PURPOSE HEATER . . . For manufacturing areas, warehouses, garages, commercial buildings —with standard non-ferrous heating coils.

★ HEAVY-DUTY HEATER . . . For continuous-duty high-pressure systems, or industrial process work—with wrought iron heating coils.

★ FOR APPLICATION SERVICE . . . Call your nearest Sturtevant Sales Engineer or write Westinghouse Electric Corporation, Hyde Park, Boston 36, Mass. . . . ask for Booklet B-5188.

Industry's Most Complete Line *For:*
Heating & Ventilating — *Cooling & Dehumidifying*
Industrial Processes — *Electronic Air Cleaning*

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S Westinghouse

J-80451

For more about these products, circle item numbers on Reader Service card next to back cover.

24—Indexing Table, rotary, fluid-feed type, holds and delivers small parts to drill tap, swage, stake, etc. Adjusts to 8, 12, or 24 stations accurate to 0.003 in. Indexes slow or fast, to 2800 per hour. Handles tables to 20 in. Easy to tool up. *Mead Specialties Co.*

25—Extendable Crate Clamp for maker's "Skylift" electric trucks speeds handling of crated products. Lift is 107 in.; clamp can reach in and pick up crate from second tier in boxcar or warehouse. Reaches 24 in.; has side-shifter. *Automatic Transportation Co.*

26—Water-Chiller, 25-ton steam-operated unit, incorporates its own operating controls; reducing installation problems. Package unit requires only simple steam and water connections plus 115-volt line to operate controls. Vibration is minimum. *Servel, Inc.*

Turn the page

COLORS that roll on dry!

LANE MARKING COLORS that have revolutionized lane marking methods! "SCOTCH" Brand Plastic Tape No. 471 gives you eight bright colors that are simply *rolled* onto the floor . . . are perfectly dry and ready for traffic when applied. Fast and easy . . . yet so *money-saving permanent!* Tape sticks at a touch to any clean, dry surface; lasts up to 2 years; is unaffected by acids, greases, salts, or most common commercial solvents. Tape colors can easily be cleaned with gasoline or most commercial solvents. Ask your Tape Distributor for complete information, or write us for folder described below.

PLASTIC TAPE

. . . one of more than

300 Pressure-Sensitive Tapes

for industry trademarked . . .

REG. U.S. PAT. OFF.

SCOTCH

BRAND

Look what you can do with it!

EVEN HEAVY materials-handling equipment won't "break down" "SCOTCH" Brand Tape No. 471. Use it for marking parking and storage areas on concrete, wood, painted or composition surfaces.

ORGANIZE production flow areas; designate aisles; "code" work areas with "SCOTCH" Brand Plastic Tape No. 471. Eight colors for "color key" systems. Easy-to-apply tape sticks at a touch!

IDENTIFY fire stations, emergency equipment locations. Mark danger areas, obstacles, low clearance passages. Special markings are easy to create; are ready for traffic without drying time!

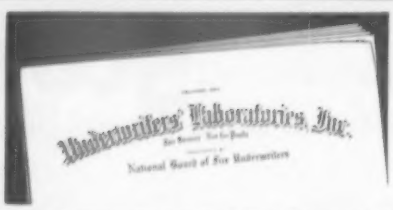
FREE folder describes "SCOTCH" Brand Plastic Tapes for Lane Marking in detail. Just write on your letterhead: Minnesota Mining and Mfg. Co., St. Paul 6, Minn., Dept. CO-16.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.
Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

In Hazardous or Coded Areas Specify RESOLITE FIRE-SNUF The Only Fiberglass Panel Labeled by Underwriters'

Fire-Snuf Panels are the *first* and *only* translucent, fiberglass-reinforced panels to be listed by Underwriters' Laboratories, Inc. They carry the UL label as evidence that they have and are continuing to meet Underwriters' rigid specifications.

They should be specified for skylights, sidewalls, partitions and glazing where fire hazards are unusual or codes call for a flame spread rating of below 75. This rating is equivalent to the Building Officials Conference of America (BOCA) classification of "slow burning" or "fire retardant." These panels are self-extinguishing and will not support combustion.



Complete test reports on the fire hazard classification of Fire-Snuf by Underwriters' Laboratories Inc., are available from the manufacturer on request.

Made with fire-retardant Hetron* polyester resin, Fire-Snuf panels retain all the best features of standard Resolite—shatterproof safety, strength, translucence, stability and load bearing characteristics.

*Ⓡ Hooker Electrochemical Co.

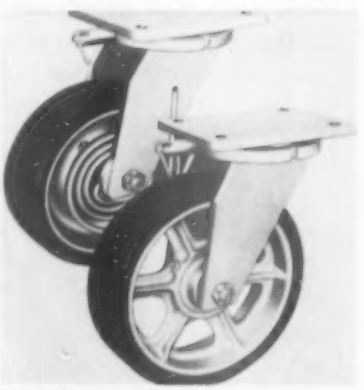
Fire-Snuf is molded in flat panes for glazing and in all standard Resolite corrugations in lengths up to 13 feet and widths up to 42 inches. For additional information consult your distributor or contact

RESOLITE Corp.
Box 503, Zelienople, Pa.
Office and Warehouse, CHICAGO, ILL.
Export Office, HOUSTON, TEXAS
Distributors in principal cities, U. S. and Canada

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

27—Steel-Wool Pad for floor care is welded for longer wear—prevents shredding and bunching; allows pad to wear evenly. Comes in grades for every need—refinishing, dry cleaning, polishing between refinishings, etc. For any disk-type machine. *Finnell System, Inc.*



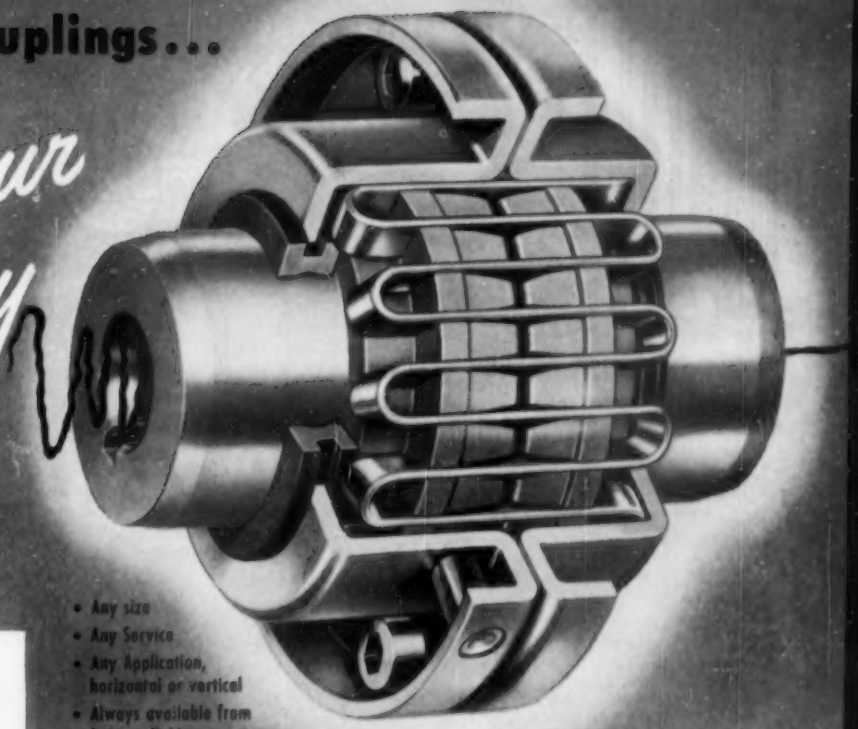
28—Casters, heavy-duty, support up to 950 lb. for long distances, at towing speeds to 20 mph. Ideal for movement of raw stock and finished goods, as well as engine stands, assembly-line dollies, etc. Rigid and swivel units; 8-, 10-, and 12-in. sizes. *Bassick Co.*

29—All-Position Electrode, iron-powder type, is for jobs where all-around, universal electrode is needed for welding in any position. "Improved Fleetweld 47" mild steel with ease, at high speed, on a-c or d-c. ⅛-5/16-in. diameters. *Lincoln Electric Co.*

Turn the page

Falk Steelflex Couplings...

Protect your machinery in 2 ways



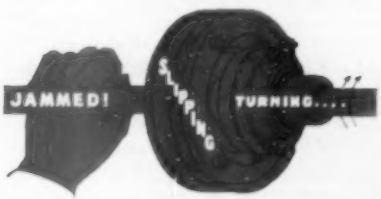
- Any size
- Any Service
- Any Application, horizontal or vertical
- Always available from factory, field or distributor stocks

Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance . . . are easy to install, lubricate and disconnect . . . and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

LOW COST TRANSWALL®

Here's the new *low cost* solution to draft problems in your factory.

Use TRANSWALL at shipping exits, traffic outlets, receiving entrances, etc. . . . for effective protection of nearby workers.

TRANSWALL's *ready retractability* **lets you** slide curtains out of the way when not in use . . . giving free use of floor space. No need to build costly temporary partitions during winter and then tear them out in summer.

TRANSWALL is easy to install. Nylon rollers support the curtain in overhead track. TRANSWALL is available in custom sizes to suit specific needs. Many possible combinations permit great versatility in layouts.

Write for Complete Information. Let our engineers suggest the TRANSWALL layout to solve your draft problems. No obligation.

This TRANSWALL Draft-Stopper at a new car assembly plant protects workers from icy winter drafts at service doorway. No costly airlocks or heating devices are needed.

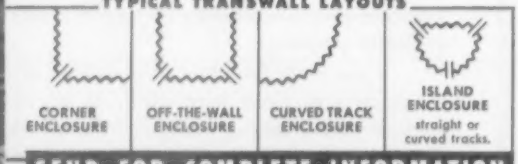
Make Your Plant NOISE-SAFE

TRANSWALL Curtains Reduce Factory Noise as Much as 22 Decibels...

A TRANSWALL Curtain 20 ft. wide retracts to only 2 ft.

Noise is costly . . . control it with TRANSWALL. Here's the low cost sound barrier that isolates noise areas *anywhere* in your factory . . . see typical layouts below. Layouts may be readily changed to suit new floor plans, yet noise reduction makes 95% of factory areas noise-safe.

TYPICAL TRANSWALL LAYOUTS



SEND FOR COMPLETE INFORMATION

TRANSWALL Coated Products
BEMIS BRO. BAG COMPANY
610-L South 4th Street • Minneapolis 15, Minn.

Gentlemen: Please send me complete information on TRANSWALL: ☐ NOISE CONTROL ☐ DRAFT CONTROL

NAME_____
FIRM_____
ADDRESS_____
CITY_____ ZONE___ STATE_____

BEMIS BRO. BAG CO.

For more about these products, circle item numbers on Reader Service card next to back cover.

30—Drip-proof Motors are made in re-rated NEMA sizes—frame sizes 182, 184, 213, 215, 254U, 256U. Designed with many improved features and performance. Low air opening in end-bell protects winding from liquids and abrasive dust. *General Dynamics Corp.*

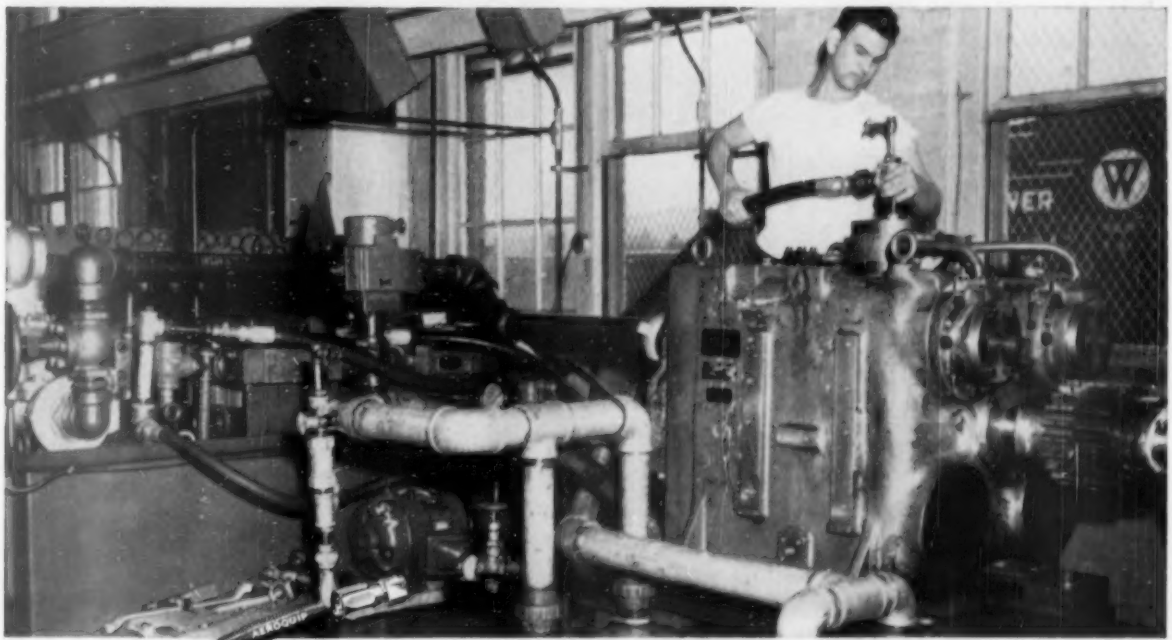
31—Truck-Cranes move from job to job with speed. "Zephyrcranes" feature power hydraulic control that permits operator to control working operations with ease—reduces fatigue, increases output. Five models from 12½ to 35 tons capacity. *Link-Belt Speeder Corp.*

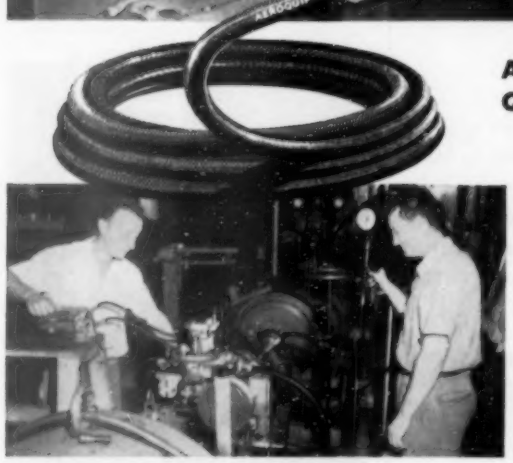
32—Electronic Humidity Controller automatically operates large or small humidifiers, dehumidifiers, air conditioners; maintains control within plus or minus 1.25% relative humidity. "Humistat" is easy to wire and set; needs no recalibration. *American Instrument Co.*

Turn the page

"Our Test Stand Hook-Up Time Has Been Reduced From Days To Hours"

SAYS HENRY LEGERE, *Hydraulic Test Foreman, Waterbury Tool Division of Vickers Incorporated*





Size 5 heavy duty transmission for cargo winch drive shown in a typical test stand hook-up. Notice how Aeroquip flexible hose lines are used to eliminate need for alignment.

AEROQUIP FLEXIBLE HOSE LINES INSTALL QUICKLY... ELIMINATE ALIGNMENT PROBLEMS

Pressures as high as 5,000 p.s.i. are encountered in the testing of hydraulic equipment produced by Waterbury Tool Division of Vickers Incorporated, Waterbury, Conn. Aeroquip hose lines meet all performance requirements, and make it possible for laboratory personnel to make test stand installations quickly and easily.

Henry Legere, Test Stand Foreman, reports that one installation, normally requiring four hours to form and fit piping, is accomplished in *5 minutes* when Aeroquip hose lines are used!

A supply of Aeroquip bulk hose and reusable fittings will help you three ways: (1) Cut inventory because you can make Aeroquip hose lines to required length in minutes; (2) Cut installation time because all alignment problems are eliminated; (3) Eliminate failures because Aeroquip hose lines are exceptionally tough and durable.

Write for complete information.

Support Junior Achievement
Junior Achievement Week, January 29-February 4th

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

PREMIUM CRANE SERVICE AT ECONOMICAL PRICES

Series "D" 'Load Lifter' Cranes are standardized, mass-produced cranes for average industrial service. They are priced far below other cranes for similar use, yet built into them are performance-proved features like those in "Shaw-Box" Heavy-Duty Cranes.

Three-girder bridge construction eliminates whipping and skewing. Bridge and trolley wheels are fixed on axles that rotate on antifriction bearings. Spotting is easy and accurate with fast-acting brakes and variable speed control, operated by push buttons on floor-controlled cranes and by master switches on cage-controlled cranes. You get the smooth efficiency of ball or roller bearings, plus gearing that operates in oil in sealed housings.

Put the dependable, economical service of a low-priced Series "D" All-Electric 'Load Lifter' Crane into your operations. You'll like the easy maintenance and the many protective features that safeguard man, load and crane. Capacities: 1 to 20 tons. Three basic types and three trolley styles available. Selection is easy. Write for Catalog 221 and make your choice.

'Load Lifter' **CRANES**

MANNING, MAXWELL & MOORE, INC. Muskegon, Michigan
Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

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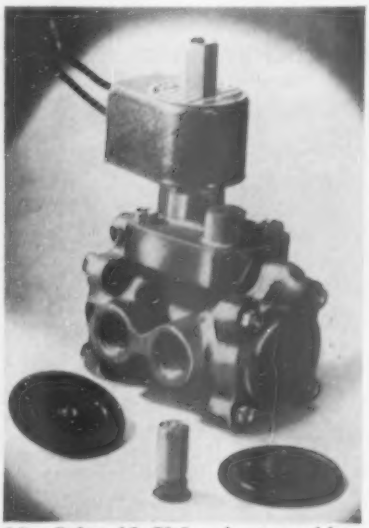
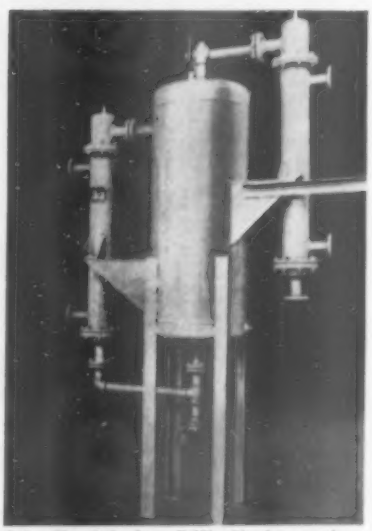
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

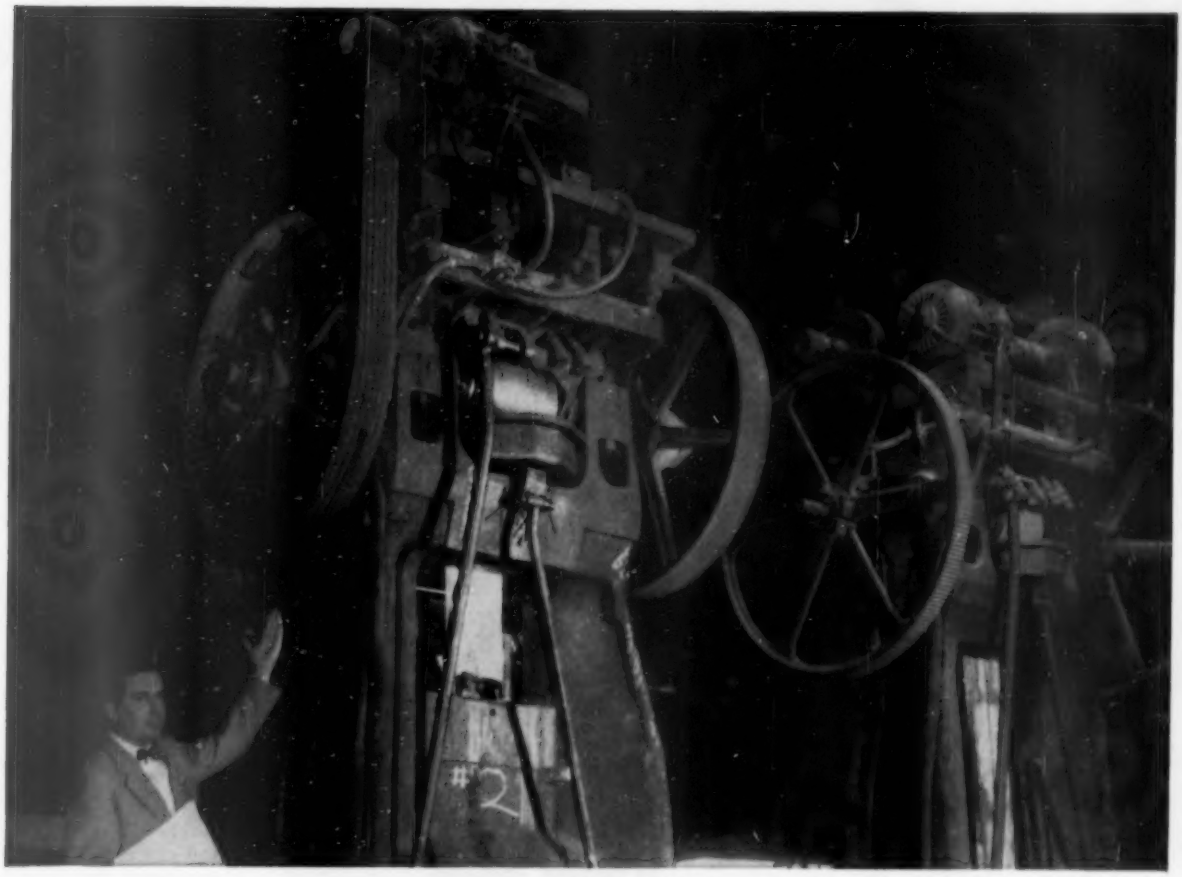


33—Solenoid Valve is a packless three-way unit utilizing just three operating parts—two Hycar diaphragms and one stainless steel solenoid core. Seat regrinding or lapping has been eliminated. Ideal for automatic and remote control of machines. *Automatic Switch Co.*



34—Reclaiming Still eliminates impurities in solvents and allows their re-use. For batch or semi-continuous operation. Five sizes in capacities to 300 gal. per hour. Heating medium is steam, water is used in condenser. Carbon steel and stainless. *Struthers Wells Corp.*

Turn the page



SAM RAUDEBAUGH, sales engineer for Ohio Belting and Transmission Company, Worthington distributor, checks installation of V-belt drive at Dana Corporation's Toledo Division.

V-belt drive hammers home 15% production increase

Worthington distributor solves problem and reduces customer's maintenance costs from $2,500 to $10 a year

That's the report, after a year and a half of operation, on the Worthington Multi-V-Drive installed in place of a costly gear drive on a board hammer at the Toledo Division of the Dana Corporation, Toledo, Ohio.

The old drive just couldn't take the shock loads the hammer was handing out in the auto part forging operation. Gear teeth and shafts kept giving way. The result: a $2,500 yearly maintenance bill plus production loss due to downtime. After looking at these figures, Dana engineers talked to Ohio Belting & Transmission Company, Worthington distributor, who recommended a new Worthington V-belt drive with Worthington QD sheaves, Worthington-Goodyear V-Belts and a tension-control motor mount.

Breakdown troubles vanished. Total maintenance cost in the first year: $10! That was proof enough for the Dana Corporation; they're changing over the 15 remaining hammers to the same kind of drive.

Find out how the Multi-V-Drive combination of Worthington QD sheaves and matched Worthington-Goodyear V-belts can work for you. Get in touch with your nearest Worthington distributor — or write Worthington Corporation, Mechanical Power Transmission Division, Section MV.5.28, Oil City, Pa.

MV.5.28

WORTHINGTON

BUY THESE WORTHINGTON STANDARD PRODUCTS FROM YOUR LOCAL DISTRIBUTOR

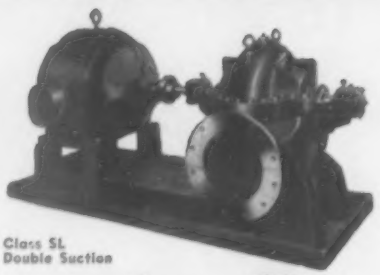
Compressors • Pumps • Multi-V-Drives • Variable Speed Drives

WHICH OF THESE "BUFFALO" PUMPS COULD BE SOLVING YOUR PROBLEMS RIGHT NOW?

(Efficiently — Economically)

CLEAR WATER

"Buffalo" Double Suction Pumps are the finest example of the "Q" Factor* that gives you the most for your pumping dollar. Hydraulically balanced, highly efficient and durable. In sizes to deliver from 10 to 14,000 gpm for circulating, air conditioning, other plant services. *Request Bulletin 955-Q.*



Class SL
Double Suction

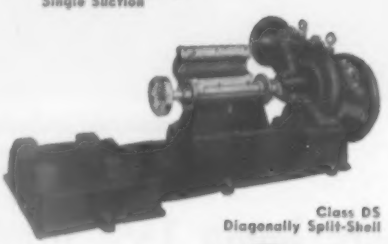
BOILER FEED

For boiler feed and other clear water service against high pressures, *write for Bulletin 980* and see how efficiently these rugged "Buffalo" Type "RR" Pumps perform. In 2 and 4 stages to handle up to 500 psi. Capacities up to 900 gpm.

Class RR Multistage
Single Suction

PAPER STOCKS

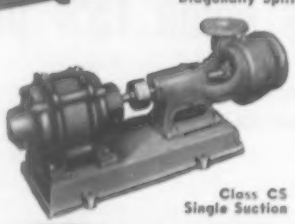
For handling high consistency liquids, you'll save money and trouble with non-clogging "Buffalo" Paper Stock Pumps. Available in alloys or rubber-lined for corrosive and abrasive liquids. A pump for every job described in *Bulletin 953.*



Class DS
Diagonally Split-Shell

CHEMICALS

A complete line of "Buffalo" Pumps, ready to handle corrosive or abrasive liquids at least maintenance cost. Write for *Bulletins 976 and 982.*



Class CS
Single Suction

OTHER PUMPS

"Buffalo" builds Vertical Ejectors, Sewage Pumps, Fire Pumps, Marine Pumps and the husky, space-saving Close-Coupled Pump shown. In short, there's a "Buffalo" Pump for best results in any application you may have in mind. Write us about *your* problem!

Class CCL Close-Coupled
Write for Bulletin 957-D.

*The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.

"Buffalo" PUMPS

BUFFALO PUMPS

DIVISION OF BUFFALO FORGE COMPANY

471 BROADWAY • BUFFALO, N.Y.

Canada Pumps, Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

35—Shuttle-Type Conveyor is ideal for installation of great length with low head room. Operates on single level without need of a second level return. Delpark-Jamesway units are priced by foot, engineered to job; portable or stationary. *Industrial Filtration Co.*

36—Combustion Tester is a portable, precision instrument for measuring oxygen and combustibles in exhaust gases. Oxygen results are registered on scale with 0-5 and 0-21% ranges; combustibles, 0-3 and 1-15%. *Davis Emergency Equipment Co.*

Choose This

RUGGED COLSON TRUCK

for your roughest, toughest handling jobs

The COLSON Push E-Z Truck

is a heavyweight champ that takes any beating you can give it and comes back for more. It's the strongest hand truck ever built. Capacity with metal or molded plastic wheels, 6000 pounds; with rubber-tired wheels, 3000 pounds. Platform is of steel or selected hardwood.

Despite its unusually heavy, rugged construction, comparative tests show that this truck, fully loaded, starts and rolls with but slightly more than half the effort required to move the average factory truck.

COLSON ForgeWeld Casters

Here's the world's finest caster for extra heavy duty requirements. Wheels of cast steel, iron, rubber or molded plastic in capacities up to 6000 pounds per caster.

Equip your shop trucks with COLSON ForgeWelds, and your caster replacement problems are over.

Whether you are interested in a fleet of factory trucks or one set of replacement casters, it pays you to call on COLSON — maker of the country's most varied line of quality materials-handling products.

Write us for free booklet on COLSON materials-handling equipment, or better still, look in the yellow pages of your local phone book (under "Casters" or "Trucks — Industrial") for the COLSON office near you.

CASTERS • HAND TRUCKS • LIFT JACK SYSTEMS
HYDRAULIC, ELECTRIC AND MECHANICAL POWER LIFTS
AND TRANSPORTS

THE Colson® CORPORATION

Elyria, Ohio

Pangborn Dust Control

Saves $14,000 a year for Woodall

The Long Island plant of Woodall Industries, Inc., had a serious problem. Fabricating Masonite for its hundreds of products released so much dust that, without efficient dust control, work would be practically impossible. So Woodall installed a Pangborn Dust Control system.

The result? The dust collected not only leaves the plant dust-free but provides *all* the fuel for heating and processing requirements. Savings on fuel bills amount to $14,000 a year! Pangborn Dust Control at Woodall pays its own way *with a profit* for the firm.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Wet or Dry Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 2100 Pangborn Blvd., Hagerstown, Maryland.

Pangborn
CONTROLS DUST

FACTORY / EQUIPMENT NEWS
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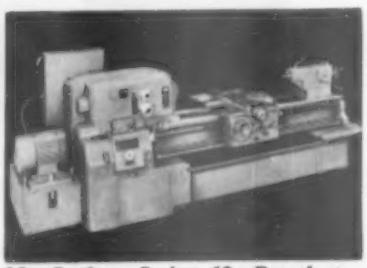
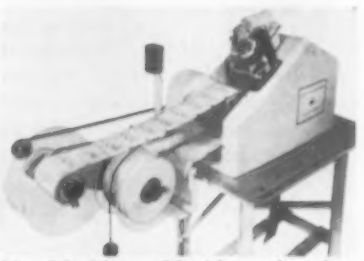
For more about these products, circle item numbers on Reader Service card next to back cover.

37—Dollies for moving heavy equipment bolt to machinery like over-size roller skates; go over uneven floors, around 360-deg. turns; roll on and off trucks. Machinery is simply raised with mover's jack or fork lift. Four "Mighty Movers" support 90 tons. *Acorn Co.*



38—Lathes, Series 62, Preselector Dyna-Shift line, is made in eight new models, making 12 altogether. All feature headstock on which spindle speed can be obtained with setting of one dial; may be set for next cut while lathe is making a cut. *Monarch Machine Tool Co.*



39—Marking Machine imprints variable data on die-cut roll labels. Permits imprinting partially preprinted labels in required quantities, as needed. Model 88A imprints maximum area of 6x2 in., on labels to 6x4, at rates of 100 to 125 per minute. *Markem Machine Co.*

Turn the page

When Your Safety Director Fights for Every Dollar, Respect Him—

He Can Save You Many More in Preventing Accidents Like This!

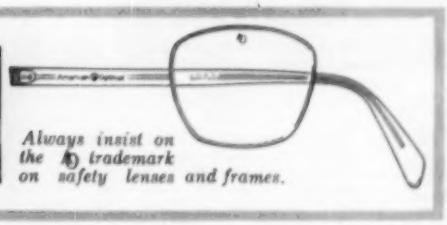
A rock drill operator in a silver and lead mine lost the sight of one eye when struck by a rock chip dislodged by his drill. A court awarded $2,755. Pity of it is that a quality Chipper's Goggle costing only about $2.30 would have prevented this accident. The mine management would be ahead by $2,753.70 plus medical and other hidden costs — and the miner would still have his eye.

To prevent these *unnecessary* high costs, more and more managements are putting the job of accident prevention in the hands of a specialist — and *backing him up!* He can pay for his salary many, many times over in the accidents he prevents and the quality of the protective equipment he recommends . . . in eye protection, safety clothing or respiratory protection. For instance, when he recommends an AO† Eye Protection Program, he *knows* you'll get a better break on insurance costs, save on idle machine charges, and take no chances on key workers being knocked out and slowing up production. He knows you'll improve workers' morale, also. Ask an AO Safety Representative to call with all the facts.

†T.M. Reg. by American Optical Company

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Always insist on the AO trademark on safety lenses and frames.

FASTER, EASIER SCHEDULING!

Free literature shows how McCaskey Machine Control Board simplifies machine loading, scheduling, dispatching, job assignments

The compact, adaptable unit shows work ahead for each machine or man, keeps work orders in sequence. Adjusts for schedule changes eliminating revision of lists, records and delays between planning and dispatching. Assures operation on schedule. Effective in production, assembly, maintenance or engineering.

We can show you how others have used McCaskey Controls successfully and economically. Let us send you the complete facts.

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • MAINTENANCE • COSTS

Division of

VICTOR ADDING MACHINE CO.

Manufacturers of Business Machines, Cash Registers, Business and Industrial Systems, Electronic Equipment, Electri-Cars.

3900 N. Rockwell Street — Chicago 18, Illinois

MAIL COUPON TODAY!

VICTOR ADDING MACHINE COMPANY, DEPT. F-156
McCASKEY INDUSTRIAL DIVISION
3900 N. Rockwell Street, Chicago 18, Ill.

Please send me free literature on how McCaskey Machine Control Board simplifies machine loading, scheduling, dispatching and job assignments.

Name .....

Position .....

Company .....

Address .....

For more about these products, circle item numbers on Reader Service card next to back cover.

40—Fireproof Chests and Safes are made in five models: storage chest, indexed vertical file chest, miniature private protector box, wall safe, floor safe. All protect for one hour at 1700 deg. F., except miniature (½ hour at 1550 F.). *Lyon Metal Products, Inc.*

41—Ram Trucks for heavy-duty coil handling are made with capacities of 20,000-80,000 lb. Features: dual power plants with separate drive motors and reduction units for each pair of drive wheels, maximum motor protection, narrow width, many others. *Elwell-Parker Electric Co.*

42—Wire Guides solve problem of pulling several conductors into conduit without skinning wires and knuckles. Form smooth bend for conductors to be guided into conduit smoothly, evenly. Does not slip, yet removes easily. ½- to 1¼-in. diameters. *Ideal Industries, Inc.*

Turn the page

NOW — ORDER ROEVAR MAGNET WIRE PACKAGED FOR TOP SPEED IN YOUR PLANT

HERE'S A FAMILY PORTRAIT of Roebling packages for Roevar Magnet Wire. At left is the time-honored spool available, of course, in all standard sizes. Next are three fibreboard drums containing 100, 250 and 500 lbs. of magnet wire. And last is a pail—metal—100 lb. size.

Many users have already converted—or are planning to convert—to drums or pails. These big containers cut down on stoppages and threadings. They eliminate the need of returning spools—save bookkeeping and handling—boost winding speeds.

In plants all over America

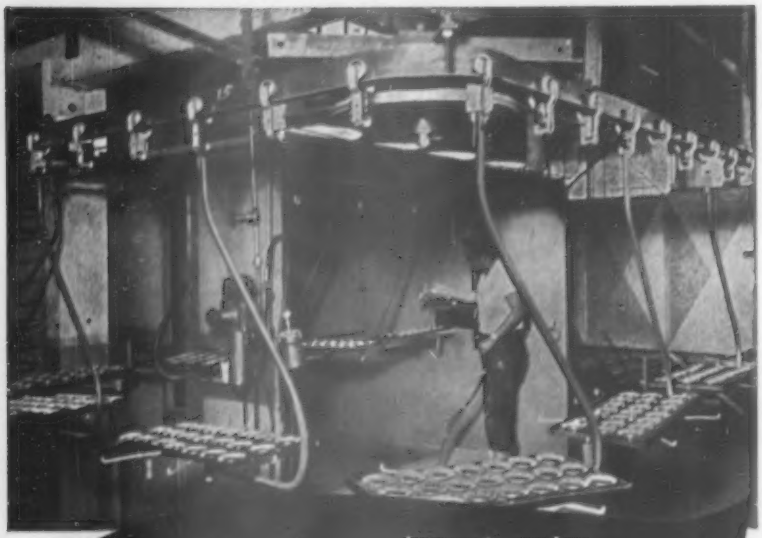
Roevar Magnet Wire is today's standard specification. Roevar insulation is far tougher than conventional enamel. It bends and stretches remarkably without cracking or loosening from the conductor ...has high resistance to baking temperatures and to the solvents in coil-treating varnishes...comes in sizes #8 to 40 A.W.G. Write for full information and samples.

Roebling fibreboard drums and the metal pail are non-returnable. In line with the modern trend, they are bringing new efficiency and economy to winding operations.

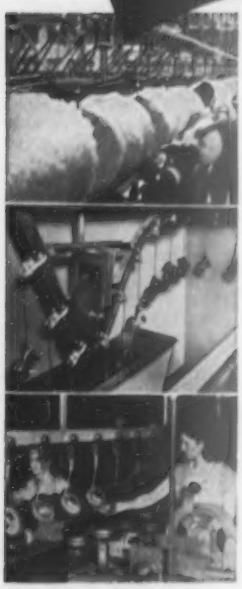
ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 924 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 5555 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4501 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1950 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.



...here's why
BUSCHMAN
OVERHEAD CABLE
CONVEYORS
give you
GREATER SAVINGS!



LOWER INITIAL COST — Buschman "Universal" Cable Conveyors not only cost less but also outperform heavier, more expensive conveyors for light and medium-weight applications.

LOWEST MAINTENANCE COST — Constant take-up readjustment is eliminated because of a safety factor of 14-to-1 or greater.

LOWEST REARRANGEMENT COST — Exclusive Buschman design plus lightweight all-bolted construction make future changes fast and easy.

MORE COMPACT DESIGN — Shorter radius curves and dips permit more complete utilization of production and storage space . . . both overhead and at work level . . . require less room inside industrial ovens, washers, dip tanks, etc.

SMOOTHER OPERATION — There are no pulsations or jerks to damage delicate parts or finishes when your product is handled on Buschman Cable Conveyors.

PRE-ENGINEERED — Using Buschman standard stocked parts, your own crew can set up a "Universal" Cable Conveyor tailored to your specific requirements.

Write today for catalog.

PRODUCE MORE ... FOR LESS
Buschman Conveyors
C-205-EWB

THE E. W. BUSCHMAN COMPANY
4425 Clifton Avenue • Cincinnati 32, Ohio

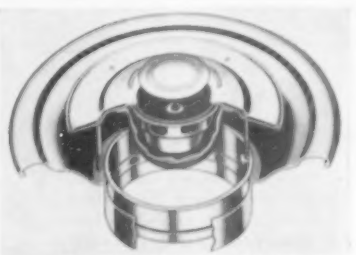
Representatives in Principal Cities

Complete Conveyor Systems For All Types of Industries • Engineered • Manufactured • Installed

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

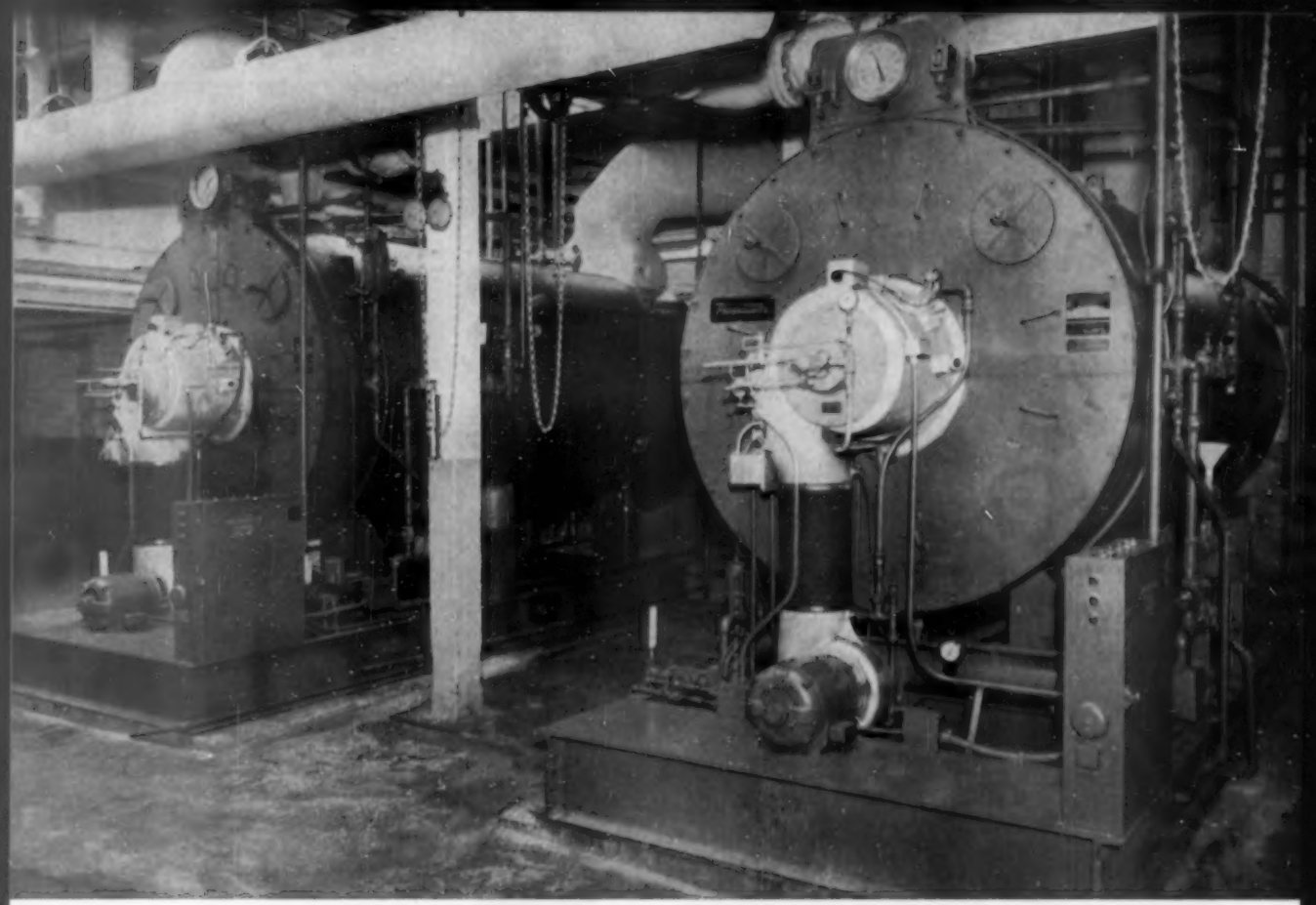
43—Airlift Tables enable female workers to move work pieces weighing several tons through many stations. "Jato" tables consist of one or two plates. Air pressure isolates plate, permitting it to float with load to next station—no friction. *James C. Hartley Associates.*



44—Loud Speaker/Air Diffuser is combined in one unit; needs only one ceiling opening. Ideal for cafeteria and assembly area where both public address or piped music and air delivery are needed. Air does not affect sounds, and vice versa. *Connor Engineering Corp.*

45—Movable Partitions can be erected by combining steel channels with any standard paneling—plywood, hardboard, plastics, glass, etc. Reusable framing patterns include floor-to-ceiling, open ceiling, 7-ft. office divider, cubicle, railing, etc. *Unistrut Products Co.*

Turn the page



$9,040 Saving in Steam Cost

WITH *Powermaster*® PACKAGED AUTOMATIC BOILERS

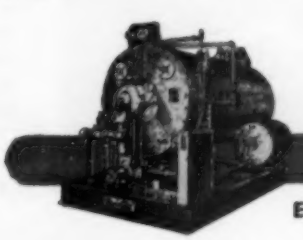
You get MORE than low-cost steam with Powermasters:

- ★ Low-cost, space-saving installation
- ★ Fast steaming
- ★ Instant response to load changes
- ★ Quick fuel change-overs
- ★ Clean, dry steam
- ★ Automatic operating and safety controls
- ★ High fuel economy at all loads
- ★ Clean, quiet operation
- ★ Smokeless combustion
- ★ One-source responsibility for complete unit
- ★ Nation-wide factory-trained service organization
- ★ Pay-As-You-SAVE Purchase Plan

These two 200 HP *Powermaster* Packaged Automatic Boilers are saving 50% of steam costs annually for a large manufacturer of clothing. In addition, they are providing hotter, drier steam for processing and comfort heating.

Completely factory assembled and fire-tested *Powermasters* have gained world-wide acceptance as dependable producers of low-cost steam or hot water. And now, you can put a *Powermaster* in your plant or building on the Pay-As-You-SAVE Purchase Plan, that helps you pay for your new boiler out of its own savings.

Write for Bulletin 1220, or ask our representative to explain why it pays to modernize with *Powermaster*.



Powermaster®

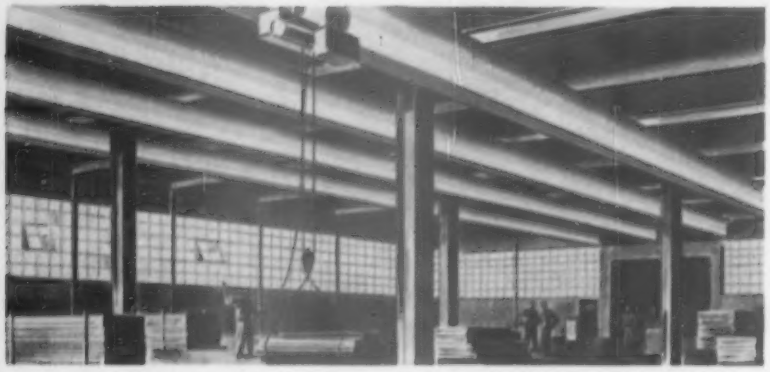
PACKAGED AUTOMATIC BOILERS

In sizes to 500 HP; pressures to 250 psi.

ORR & SEMBOWER, INC.

Established 1885 • Morgantown Road, Reading, Pa.

BEWARE this Danger Zone



BE SAFE with Insul-8-Bar

MOBILE SAFETY ELECTRIFICATION FOR CRANES · MONORAILS · ALL MOVING MACHINERY

DON'T BE SHOCKED by bare conductor accidents. Protection is now provided by low cost Insul-8-Bar enclosed conductor systems.

Safety insulation is coupled with simplicity. The basic system consists of insulated 8-bar conductors and sliding shoe collectors.

VERSATILE, TOO. Standard parts eliminate the need for costly, special engineering (e.g. factory fabricated curves are never required.)

Conductors can be placed as close as 1½" centers — side by side, horizontally or vertically. Available in capacities of 50 to 500 amperes.

These are the only systems that meet all requirements of crane, monorail and mobile machine electrification.

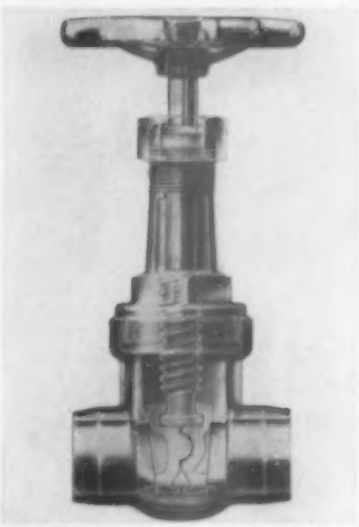
For low cost safety and trouble-free performance, insulate with Insul-8-Bar. Write for catalog and technical data.

INSUL-8-CORP.,
1369 Industrial Road, San Carlos, Calif.
Representatives In All Major Cities

INSUL8CORP.

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.



46—Valves are made in five bronze solder-end models: gate—rising stem with double-wedge disk, rising stem with solid-wedge disk, non-rising stem with single-wedge disk; check — with renewable disk and side lugs, globe—with non-metallic disk. *Lunkenheimer Co.*

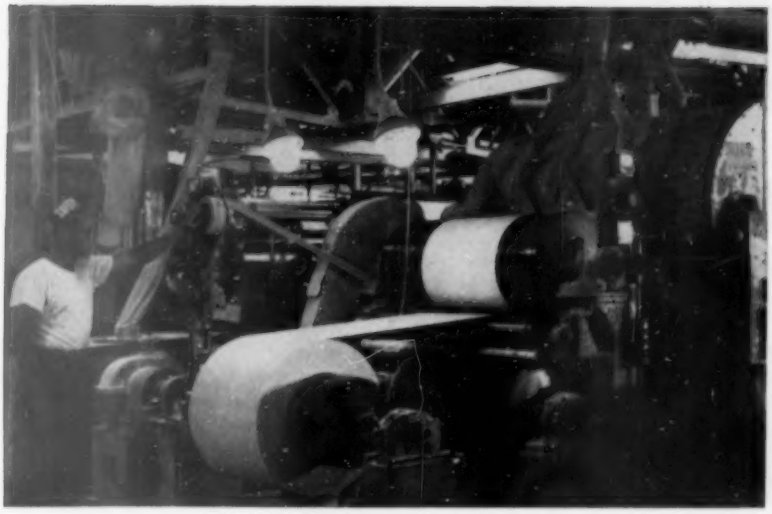
47—Cable Reel Truck, "walkie" electric, is ideal where reels of varying diameters must be handled. Handles range from 36-90 in. with no manual adjustment of lifting hooks. Capacity is 10,000 lb. (20,000-lb. unit also available). *Lewis-Shepard Products, Inc.*

48—Plastic Pipe of rigid non-plasticized polyvinyl chloride is suitable for structural use. Has no additives or fillers, assuring resistance to acids, alkalis, salts, etc. Will not support combustion. Fittings and valves will be available. *Joseph T. Ryerson & Son, Inc.*

Turn the page

DUST and FUME topics

WHEELABRATOR CORPORATION ■ Mishawaka, Indiana

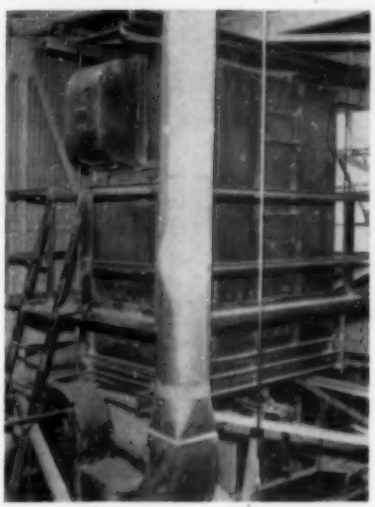


Cornstarch Recovery Pays for Complete Dust Control

Installed primarily to improve housekeeping by controlling the dust created by cornstarch used to dry coated paper, a Wheelabrator Dustube Dust Collector recovered enough of the cornstarch to pay for the entire investment within three months' time.

Since then this midwestern paper processor has installed two similar collectors to ventilate other dust creating equipment. Savings effected by product recovery with these three cloth tube collectors have amounted to $45,000 annually.

Other benefits provided are better working conditions and elimination of fire and explosion hazards through the virtually 100% collection efficiency of the three Wheelabrator Collectors.



New Dust Control Principle Provides "Ultra-Filtration"

Wheelabrator cloth tube type collectors, with an inexpensive filter aid on the filtering surface of the cloth, give collection efficiencies of virtually 100% of atmospheric dust, including extremely fine micron sizes.

Ultra filtration with Wheelabrator Collectors is already paying dividends in sewage disposal plants, power plants, greenhouses, etc. . . . where "clean" air is a necessity. Write for complete details.

How to Save Money in the Control of Chemical Dust

Dust created in the manufacturing and processing of chemicals can be recovered at a profit with virtually 100% efficiency in a Wheelabrator Collector. In addition, worker efficiency is improved through better working conditions and maintenance costs are less because dust is kept away from machinery.

Get the complete story on Wheelabrator Dustube dust and fume control. Write today for Catalog No. 372C.

How Dust Free Can a Chemical Plant Be?

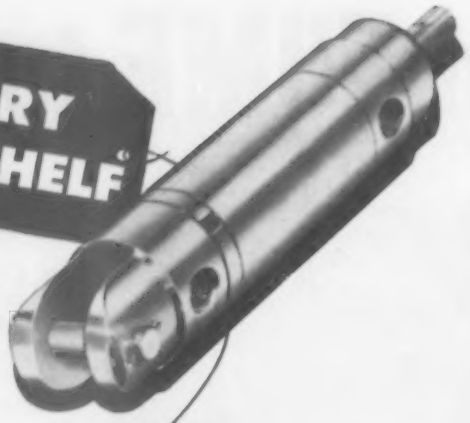
Packaging operations in this pharmaceutical plant are dust free through Wheelabrator Dust Control.

Wheelabrator cloth tube-type Collectors capture dust at the source before it has a chance to permeate the atmosphere. Any dry dust, regardless of particle size or concentration, can be handled. Virtually 100% efficiency is thus assured.

WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)
374 S. Byrkit Street, Mishawaka, Indiana

DELIVERY OFF THE SHELF

IN 64,000 COMBINATIONS

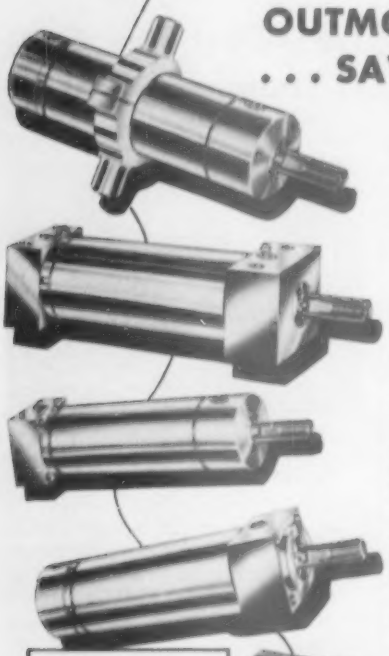


T-J

Spacemaker

CYLINDERS

OUTMODE ALL OTHERS
. . . SAVE 40% SPACE!



You'll never go back to tie-rod cylinders, once you apply T-J Spacemakers to your push-pull-lift jobs! Advantages in space saved, weight saved, greater strength and off-the-shelf delivery are among the dozens of Extras you get as Standard!

Now—these sensationally popular T-J Spacemaker Cylinders are available off the shelf *in sizes up to 8".* This means as many as 64,000 different combinations of styles, bores, strokes, mountings, etc., *immediately available!* Oil pressure to 750—Air to 200 P.S.I. Super Cushion Flexible Seals for Air . . . New Self-Aligning Master Oil Cushion. Hard chrome plated bodies and piston rods (Standard). Only from T-J can you get these new ingenious cushion designs! Send for bulletin SM-155-2. The Tomkins-Johnson Co., Jackson, Michigan.

Member of the
National Fluid Power Association

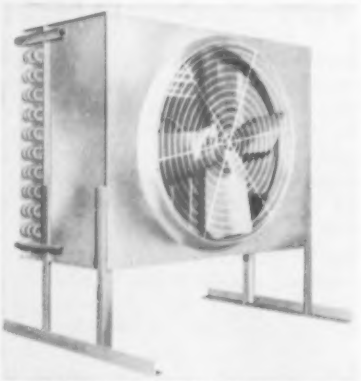
See us in
Fluid Power Area
ASTE Show
Booth 225

T-J TOMKINS-JOHNSON
DIVISIONS: AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHERS

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

49—Hydraulic Equipment Tester gives performance data for almost all hydraulic system components and accessories. Model 2632 tests at infinitely variable pressures from 500-5000 psi. Obtains variable flows to 10 or 20 gpm. by manual adjustment. *Auto Control Laboratories.*



50—Air-Cooled Condensers are designed for use with air conditioning systems when water is unavailable, water costs are high, or disposal of surplus water is a problem; also to eliminate hot compressor rooms, to boost existing systems. 2-20 tons. *Halstead & Mitchell.*

51—Pipe Insulation Wrap prevents condensation - dripping from cold pipes. "Kwikwrap" is extruded; has self-sealing beveled edges. Strip is simply applied lengthwise to pipe or tube and pressed together to form all-around, uniform covering. *Presstite Engineering Co.*

Turn the page

NOW it's 5 to 9!

Asarco now offers continuous-cast bronzes in 32 new sizes from 5 inches to 9 inches in diameter, supplementing established sizes up to 5 inches in diameter.

You can buy Asarcon Bronzes cored or solid *in the exact length you need*. You pay for no short-end scrap because there are none of the remnants you get from conventional 12-inch or 13-inch lengths.

Diameters of Asarco Continuous-Cast Bronzes now range from ½ inch to 9 inches in any size you need . . . many foundry alloys and a variety of shapes are available in all of these sizes. The famous "Asarcon 773" Bearing Bronze (SAE 660) can be shipped promptly from stock.

All bronzes produced by the patented Asarco continuous-cast process are metallurgically superior. There are no blowholes or porosity, no dross or dirt inclusions.

Write to us for more details, or get in touch with your nearby distributor of Asarco Continuous-Cast Bronzes.

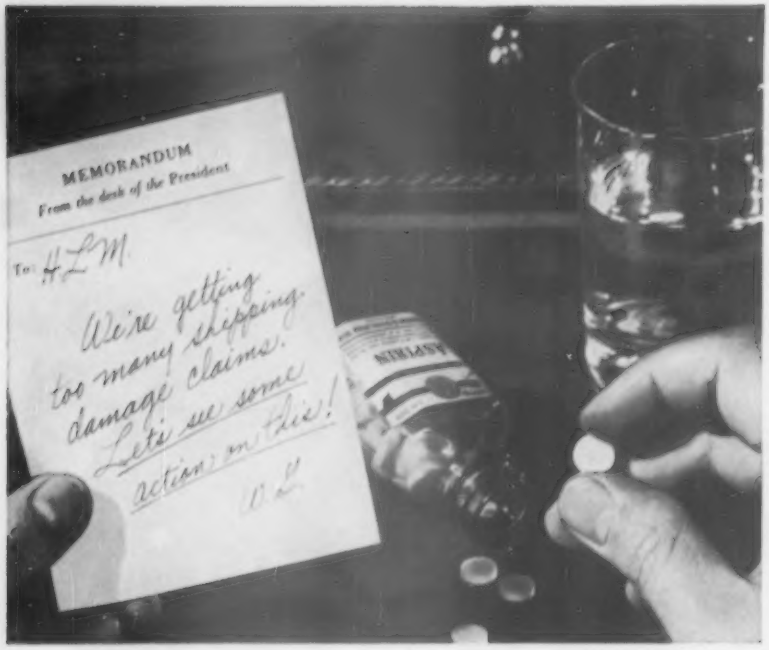
ASARCO

AMERICAN SMELTING AND REFINING COMPANY

Perth Amboy Plant, Barber, New Jersey • Whiting, Indiana

WEST COAST SALES AGENT: Kingwell Bros. Ltd., 457 Minna Street, San Francisco

IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal


MEMORANDUM
From the desk of the President
To: H L M.
We're getting too many shipping damage claims. Let's see some action on this!

There's a better way to cure shipping headaches

Action that saves shipping dollars is an Atlas Plywood specialty

If tough shipping problems are *your* headaches, remember this:

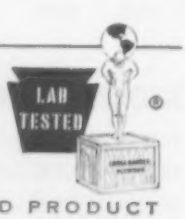
Atlas Plywood packaging engineers have come up with exactly the right remedies for many a firm. It's practically certain they can do the same for *you*.

These experts can quickly tell you: (1) whether or not you can get a *safer* shipping container; (2) whether you actually *can* cut your shipping costs; and (3) just *how much* you can save.

This Atlas Plywood service is free and without obligation on your part. Take advantage of it. Find out how you can stop wasting money on preventable product damage and too high shipping costs.

Get our 24-page illustrated booklet, "How Atlas Plywood Cuts Your Shipping Costs . . . Safely." It tells you how Atlas Plywood containers are made, how they're engineered to meet your shipping requirements — and how they earn their lab-tested label in a laboratory equipped with every modern container testing device. For your free copy, see your Atlas Plywood representative (listed in your classified phone directory). Or write to Atlas Plywood Corporation, Dept. FM-1, 1432 Statler Building, Boston 16, Massachusetts.

Atlas Plywood
CORPORATION

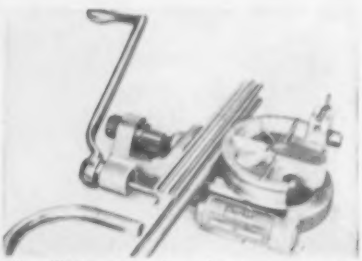


BOSTON 16, MASS. • DISTRIBUTORS IN ALL PRINCIPAL CITIES
PLYWOOD CONTAINERS • FLUSH DOORS • HARDWOOD PANELS

FROM AMERICAN FOREST TO FINISHED PRODUCT

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.



52—Tube Bender is a compact, crank-operated worm gear device for easy, manual bending to exact tolerances. "Exactol" handles annealed or 1/8H cold drawn stainless steel tubing. Slide block has grooves for six tube sizes, ¼- to ¾-in. OD. *Parker Appliance Co.*

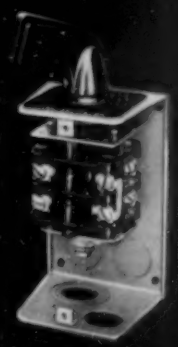
53—Portable Aluminum Dock Plate weighs only 58 lb., yet bears 12,000-lb. loads under normal operations. Two built-in stop angles eliminate slipping and sliding. Shaped to accommodate height differences between loading dock and truck bed. *F. H. Langsenkamp Co.*

54—Forward-Tipping Bucket permits truck loader to be used as loading unit for other trucks, in addition to improving digging and shoveling operations when used for self-loading. Installs on most 1½- to 2-ton trucks with standard dump body. *Ernest Holmes Co.*

Turn the page

DRUM SWITCHES
with that QUALITY look...
that are QUALITY

Bulletin 350 Style B Master Drum Switch with cover removed to show contacts

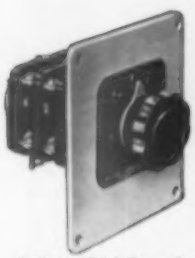


Bulletin 806 Style C Drum Switch for surface mounting

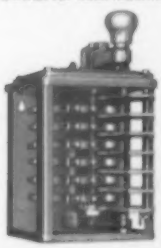
Bulletin 806 Style B Transfer Switch in Type 1 enclosure

Bulletin 350 Drum Switch in Type 4 watertight enclosure

Master Switches • Transfer Switches • Instrument Switches in Various Mountings and Contact Arrangements



Bulletin 806 Transfer Switch for flush mounting.



Bulletin 365 Drum Switch for manual speed control of multispeed a-c motors, with cover removed to show stationary and drum contacts.

Drum switches are sometimes the simplest and lowest cost units for handling sequence control . . . or for monitoring a group of indicating instruments. Often drum switches are the best answer for reversing service or for speed control of variable speed a-c motors.

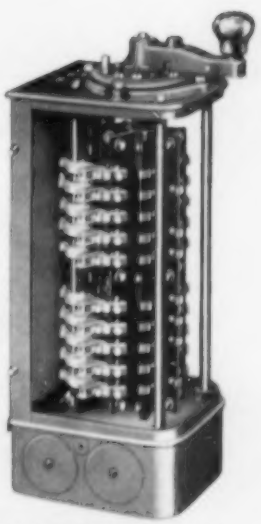
The Allen-Bradley line of drum switches includes such a broad range of types and sizes that practically any requirement can be satisfied. Silver alloy contacts of simple design . . . good contact pressures . . . rugged construction . . . assure long, trouble free life.

Though low in cost, Allen-Bradley drum switches are a QUALITY product. Write for A-B Handy Catalog.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

BULLETIN 350 STYLE A REVERSING DRUM SWITCHES

Style A Reversing Drum Switches are designed for across-the-line starting and reversing of small squirrel cage motors. Can be used for single phase motors, and for d-c shunt and compound wound motors. Will handle a-c single phase motors up to 1½ hp, 220 v; polyphase motors up to 2 hp, 220-440-550 v; and d-c motors up to ¼ hp, 115-230 v.



Bulletin 375 Drum Controller for speed control of slip-ring alternating-current motors.

1-56-M

A-B Quality

The Sign of QUALITY Motor Control

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

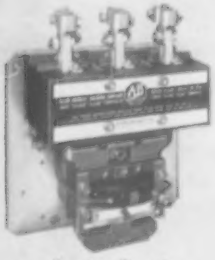
ALLEN-BRADLEY
A-C CONTACTORS

2 pole—Size 00
10 ampere

3 pole—Size 1
25 ampere

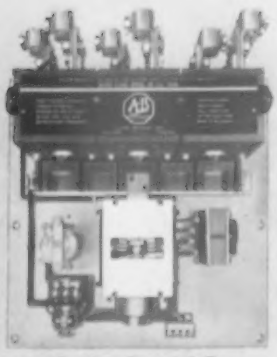
3 pole—Size 2
50 ampere

3 pole—Size 3
100 ampere

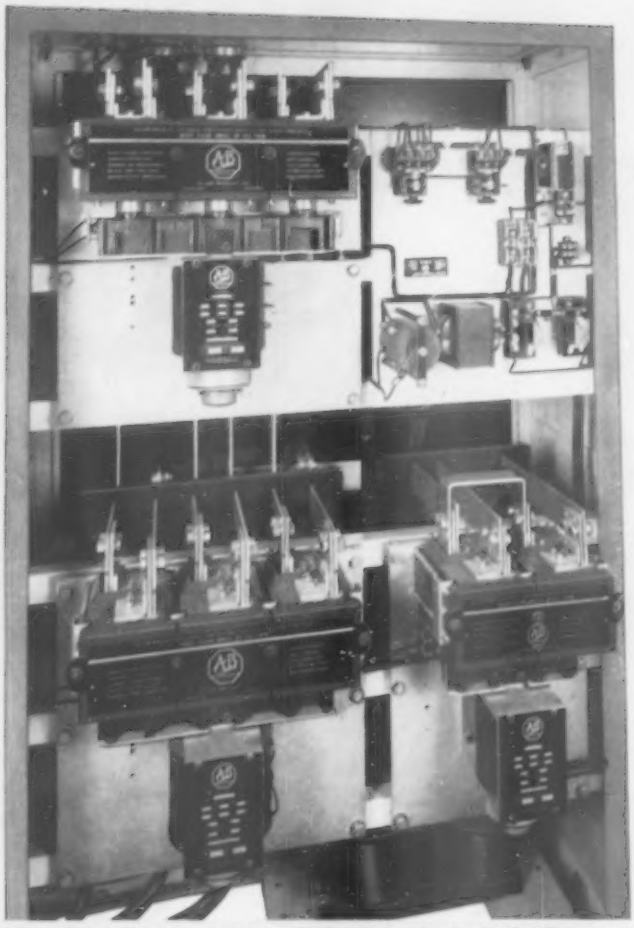


3 pole—Size 4
150 ampere

3 pole—Size 5
300 ampere



3 pole—Sizes 6 & 7
600 & 900 ampere contactors



250 Hp, Bulletin 746 automatic autotransformer showing Allen-Bradley Size 7 contactors

A-C and D-C CONTACTORS

10 to 900 Amperes

with Double Break, Silver Alloy Contacts

The only complete line of solenoid contactors on the market. Allen-Bradley offers nine sizes...from Size 00 (10 amperes) to Size 7 (900 amperes), one to four poles.

There is no contact maintenance . . . no pins, pivots, or bearings to give trouble. Just one moving part—the simple solenoid plunger. Operating characteristics are consistent for all nine sizes.

Enclosures can be supplied for general purpose, water-tight, dust-tight, and explosion-proof service.

Allen-Bradley controls are an added sales asset to any machine. May we send you our catalog?

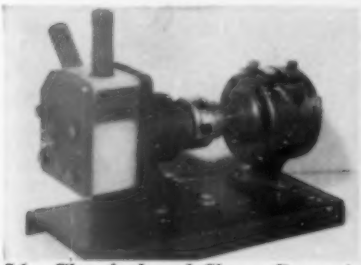
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

A-B Quality

ALLEN-BRADLEY
SOLENOID CONTACTORS
QUALITY

For more about these products circle item numbers on Reader Service card next to back cover.

55—Carton Imprinting Machine automatically feeds, imprints, power-stacks 10,000 pieces an hour. Takes sizes from 2¼ x2¼ in. to 18x 18 in.; thicknesses 0.010 to 3/16 of in.; uncoated, varnished, paraffin surfaces. Imprints area to 4x18 in. *Pitney-Bowes, Inc.*



56—Chemical and Slurry Pump is a portable, air-motor driven, self-priming unit. Air motor offers wide range of variable speed. Valve control enables variable rates of flow. Plastic, rubber, or stainless steel; to 20 gpm., 50 psi. *Vanton Pump & Equipment Corp.*

57—Machinability Test Lathe has infinitely variable cutting speeds and sufficient hp. and rigidity for practically any metal-cutting test. For selecting balanced cutting condition, studying special tools and tool geometry, material control, etc. *Monarch Machine Tool Co.*

58—Voltage Tester has current-limiting resistors, wire-wound and ceramic-insulated, built into each test prod of portable Model 61-007. Limiting current in leads to maximum of 1 amp. at 250 volts protects operator from shorts or breakdowns. *Ideal Industries, Inc.*

Turn the page

Which best fits your needs?

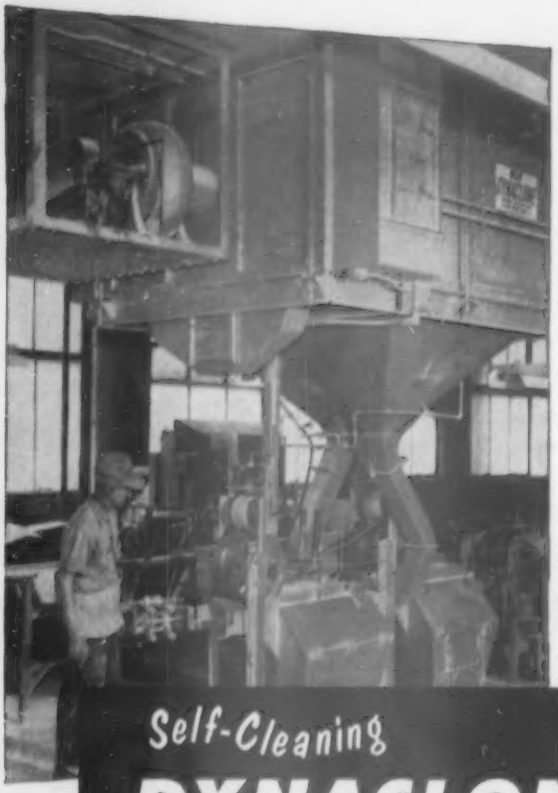
Both new—and more productive

Now Hough, pioneer and leader in the tractor-shovel industry, gives you a choice of two new sizes of front-wheel-drive, rear-wheel-steer "PAYLOADER" units. They are the finest, most productive in Hough history — and way ahead of the field in design, performance and value.

Both are especially designed for efficient stock pile work — for scooping up, carrying and dumping in close quarters.

These and larger "PAYLOADER" models, up to 2 cu. yd., are sold and serviced by a network of Hough Distributors. There is one near you ready to discuss your "PAYLOADER" applications. The Frank G. Hough Co., 755 Sunnyside Ave., Libertyville, Ill.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



1 OF 4 UNITS AT GOODRICH

Self-Cleaning
DYNACLONE
The Ultimate Dust Collector

No matter how dusty your manufacturing operation, you can effectively control the dust. Take the case of The B. F. Goodrich Company.

This company processes garden hose by passing it through pigment dusting chambers. There are two dusting chambers—shown on the floor below the filter—one for soapstone (talc) and the other for zinc stearate.

Dust-laden air from this operation is drawn through vertical ducts to the Sly Dynaclone two-compartment Filter, above. The dusting compounds are kept separate and are returned to the chambers for re-use and the cleaned air returned to the plant. *No material is wasted—all is used, meaning substantial savings. No cleaning-up operation—always a clean plant!*

Self-cleaning by reverse air, the Sly Dynaclone represents the greatest advance ever made in industrial dust collection. Without added motors or blowers, it maintains a constant, uniform suction at dust sources. No shutdowns, no shaking, no wearing of bags. In use since February, 1951, it has operated continuously—*24 hours a day*. Well pleased, The B. F. Goodrich Company has purchased large Dynaclones for three other plants.

Designers and Manufacturers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

THE W. W. SLY MANUFACTURING CO.
SINCE 1876
4755 TRAIN AVENUE • CLEVELAND 1, OHIO

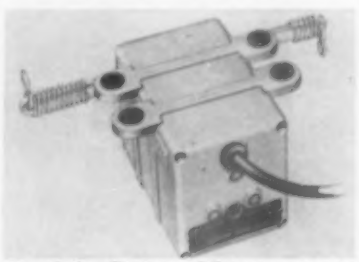
OFFICES IN
PRINCIPAL CITIES

PIONEERS AND LEADERS IN INDUSTRIAL DUST CONTROL

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

59—Vacuum Cleaner for wet or dry clean-up jobs creates suction equal to 63-in. water lift with closed orifice. Steel tank holds 10 gal. wet, or 1½ bu. dry pickup material. G-400 rolls freely, passes through 18-in. doorway; will not tip. *Multi-Clean Products, Inc.*



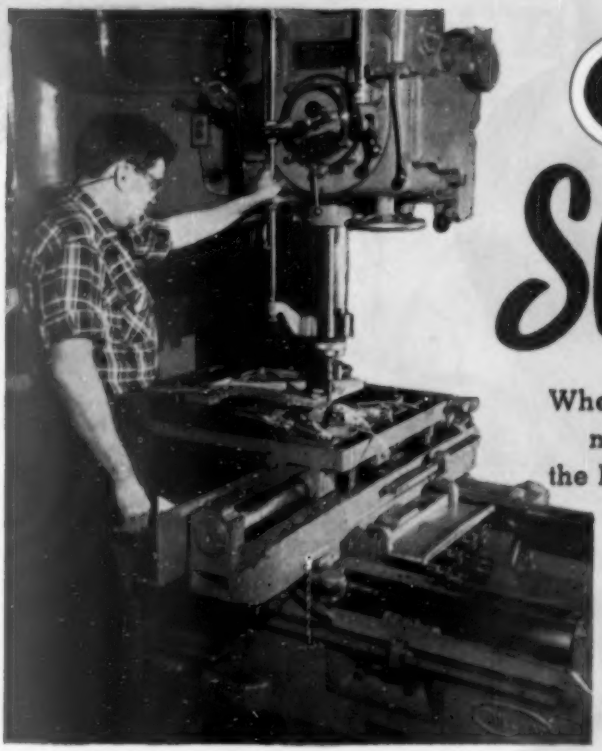
60—Safe Return Motor actuates switches, levers, other mechanical devices requiring straight-line action. Converts power from pair of motors to lateral motion through rack-and-pinion gear system. Dual motors enable stroke on both forward and return. *Gleason-Avery.*

61—Masonry Drills, carbide-tipped, have longer shanks to permit deep-hole and through-drilling. Feature butt-welded shanks of 12 and 18 in.; diameters of ¼-1½ in. "Twist-tested" for heavy drilling. 24 drills in the line. *Carboloy Dept. of General Electric Co.*

Turn the page

ACCURATE LOCATING PERFORMANCE

Acclaimed By Customer with . . .



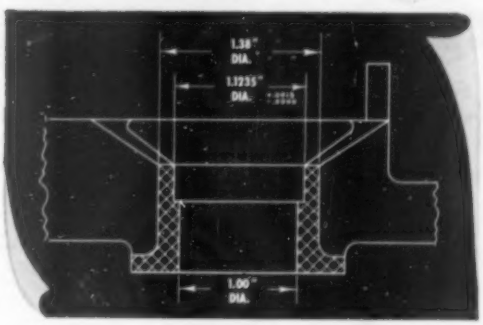
BULLARD Spacer Table

Where close tolerances must be maintained on repetitive pieces the Bullard Spacer Table is a "natural"

"The machine is simple to operate. We have found the Bullard Spacer Table very useful in our work", says a foreman at San Diego Division of Convair, "It eliminates the necessity of zeroing to a set position. And there is no chance for error, which is important when you make accurate parts for airplanes."

This same accuracy to close tolerances can be applied to your drilling, reaming or tapping operations without the high cost of jigs or fixtures.

Identical machining operations on each of three holes for battery carriage are performed on the Bullard Spacer Table.



OPERATION DATA

OPERATION	SET-UP TIME	UNIT TIME
Drill 1" dia.	.70	.2066
Counterbore 1.1235" dia. at 1.000 dia. .350" deep	.25	.0566
Face 1.38" dia.	.25	.0356

CALL YOUR NEAREST BULLARD REPRESENTATIVE OR WRITE FOR SPACER TABLE CATALOG TO

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

It's Top's

...for quick clean cuts

7 cutters for ⅛″ to 6″ pipe.

See us at Maintenance Show

Philadelphia, Jan. 23-26, Booths 1406-1410

...the efficiency-balanced

RIDGID

Heavy-Duty Pipe Cutter

Powerfully built—guaranteed not to warp or break, always tracks perfectly . . . Famous RIDGID thin-blade or heavy-duty cutter wheels of tool steel roll easily, cleanly through any pipe.* Every cutter factory-tested! Buy them at your Supply House.

*Special wheels available for stainless steel and cast iron.

For fast easy pipe cutting in tight places, RIDGID 4-wheel cutters.

RIDGID
Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U.S.A.

For more about these products circle item numbers on Reader Service card next to back cover.

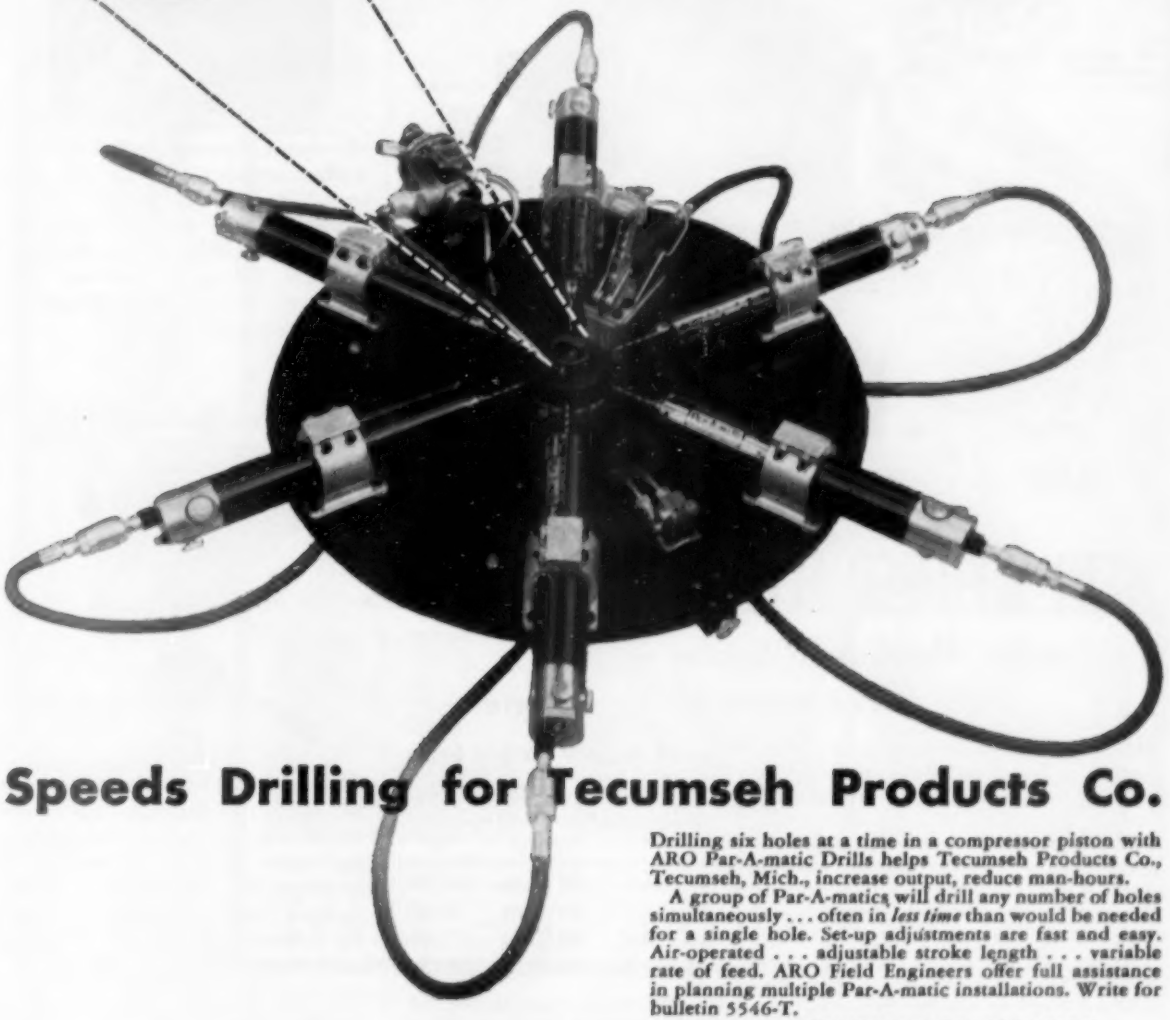
62—Nylon and Dacron Slings with integral loop terminals are non-kinking, light but strong (breaking strengths to 80,000 lb.). Nylon sling doesn't mark, dent, scratch surfaces; dacron is suitable for immersion in hot acid pickling solutions. *Smith Handling Systems, Inc.*

63—Floor Machine "walks" up and down stairs; wheels can be "locked up" for easy transportation. Features "reach-under" front housing. "Pacemaker" series is suitable for heavy-duty polishing, waxing, scrubbing, steel-wooling, shampooing. *Advance Floor Machine Co.*

64—Sub-Surface Washer combats backwash difficulties in filtration and ion-exchange materials; prevents bed fouling. Ideal where water is not turbid enough to justify clarification, but contains enough soluble solids to cause trouble. *Graver Water Conditioning Co.*

Turn the page

AUTOMATION WITH ARO PAR-A-MATIC DRILLS



Speeds Drilling for Tecumseh Products Co.

Drilling six holes at a time in a compressor piston with ARO Par-A-matic Drills helps Tecumseh Products Co., Tecumseh, Mich., increase output, reduce man-hours.

A group of Par-A-matics will drill any number of holes simultaneously . . . often in *less time* than would be needed for a single hole. Set-up adjustments are fast and easy. Air-operated . . . adjustable stroke length . . . variable rate of feed. ARO Field Engineers offer full assistance in planning multiple Par-A-matic installations. Write for bulletin 5546-T.

THE ARO EQUIPMENT CORPORATION
Bryan and Cleveland, Ohio
Aro of California, Los Angeles 7, California
Aro Equipment of Canada, Ltd., Toronto 13, Ontario
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ARO

AIR TOOLS
Also . . . AIR HOISTS . . .
LUBRICATING EQUIPMENT . . .
AIRCRAFT PRODUCTS . . .
GREASE FITTINGS

JACK of all trades ...and good at all of 'em!

HEIN-WERNER HYDRAULIC JACKS

save time and labor— cut costs to the bone

Hein-Werner Industrial Jacks offer powerful hydraulic force to simplify moving machinery, lifting heavy loads, pulling gears and pinions, bending rods, pressing bushings, and other tough industrial jobs. They are fast, safe, easy-to-use. May be used in a horizontal or vertical position. Models of 12 ton and larger have carrying and positioning handles. 30, 50, and 100 ton models have tandem pump for two-speed operation, and a drilled base for installation of pressure gauge. 12 and 20 ton models can be furnished promptly with gauge on special order.

Priced too low for you to be without 'em... order today!

Model	Capacity	Price
20.10AA	20 Tons	$46.00
30.11AA	30 Tons	89.30
50.12AA	50 Tons	135.00
100.12AA	100 Tons	297.50

Hein-Werner also manufactures Hydraulic Industrial Jacks in models of 1½, 3, 5, 8, and 12 tons capacity, as well as "Push and Pull" Hydraulic Jacks of 4, 10, and 20 tons capacity.

See your industrial supply distributor or write us.

HEIN-WERNER CORPORATION
WAUKESHA • WISCONSIN

Hein-Werner HYDRAULIC JACKS

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

65—Static Pressure Indicator-Controller controls at a range low as 0 to 0.2 in. of water. Model R-1051 can be used for pressures above or below atmospheric; for maintaining constant differential between two pressures. For dampers, etc. *Johnson Service Co.*

66—Infra-Red Radiation Pyrometer measures temperature variations where thermocouples, thermopiles, and other devices are inadequate or inoperative. Model IR-1 covers nominal range of ambient to 1000 C. Indicates variation as small as 0.1 F. *Servo Corp. of America.*

67—Water-Heater Thermostat maintains temperature to within 3 deg. F. of original calibration even after 50,000 operation cycles (about 20 years). Range adjustable from 120-170 deg. F. Can be circuit-tested during assembly or service. *Westinghouse Electric Corp.*

Turn the page

DROODLES

by ROGER PRICE

Bench Model BC-14D

Floor Model FC-30

Floor Model FC-14

"PUZZLED BABY"

You'd be puzzled, too, if your dad presented you with a bottle of *powdered* milk. Don't blame father, though . . . he's a Quality Control Engineer who's at his wit's end because of difficult inspection problems.

Happily for him . . . and the baby . . . we're in a position to help, by introducing him to the J&L Optical Comparator. This inspection device — so fiendishly ingenious that it should have been invented by me — inspects and measures all sorts of parts and objects, in a range of sizes.

The J&L Comparator makes speedy production-line inspection a cinch, it's hellishly accurate (to .0001″), and enables you to perform inspections that are not possible with any other method. Here is an instrument that's well worth your looking into (pun, 2nd class). For complete information, send this coupon *today*. We'll give your inquiry immediate attention (1st class).

JONES & LAMSON OPTICAL COMPARATORS

Precise . . . Rapid . . . Flexible . . . Easy to operate

Inspecting location of ball contact points in steering worms, plus thread forms, solves a critical problem for the automotive industry.

A J&L Comparator is used as a gauge to set and control limits of pre-set tooling for automatically controlled machining cycles.

J&L Comparator bends stamped parts to close limits — unattainable in regular process. Also inspects the parts in all planes in the same operation.

J&L JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 505 Clinton Street, Springfield, Vermont, U. S. A.

Please send me Comparator Catalog 402-C, which describes the complete J&L line of optical comparators.

name _____ title _____

company _____

street _____

city _____ zone _____ state _____

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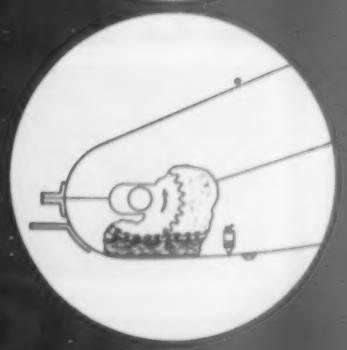


MANUAL, DRIP or IMMERSION?

Correct lubrication is essential to the long life of the chain drive. Mineral oils of varying viscosity are recommended. Methods of application are generally determined by the speed of the drive. Lubricants are applied by brush, immersion or by drip feed.

ACME'S Chain Engineers have the answers. They're yours for the asking. Whenever a chain problem arises, call in an ACME engineer . . . no cost to you! It's a part of ACME service.

FREE ACME CHAIN-TEXT!

Designers and engineers may write for a free copy of this 76 page chain text. It's loaded with chain data, specifications, illustrations and facts you should know about chain applications. Write ACME CHAIN CORP., Dept. 13B, Holyoke, Mass.

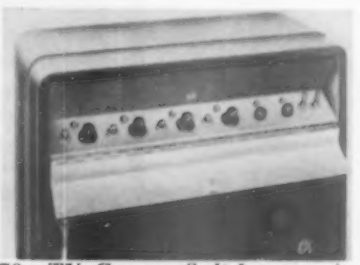
Acme Chain Corporation
HOLYOKE
MASSACHUSETTS

FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

68—Portable Hydraulic Tester tests performance and operation of hydraulic systems and components, other equipment—a system to actuate a ram on a machine tool, for instance. Detects fluid leakage, exact place and cause, internal or external. *Greer Hydraulics, Inc.*

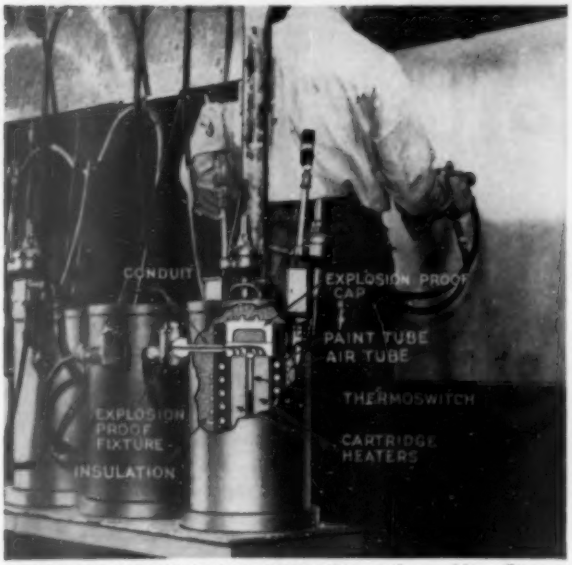
69—Adjustable Loading Ramp raises and lowers instantly from pushbutton control; features manual floating, which automatically compensates for spring deflection of truck bed during freight transfer. 10,000- or 20,000-lb. capacity units. *Rowe Methods, Inc.*



70—TV Camera Switcher permits operation of four cameras from single control. For automatic, remote surveillance of an automatic production line, timer or thermal-activated relays may be added for sequential switching of cameras. *General Precision Laboratory Inc.*

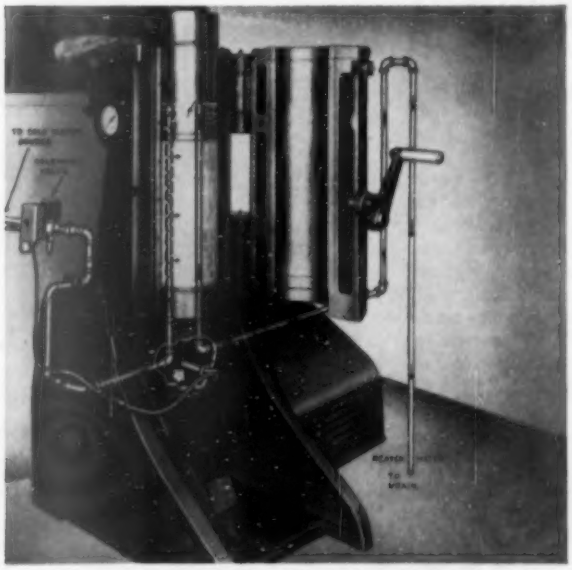
Turn the page

How would you solve these tricky temperature control problems?



1. KEEPING A PAINT HEATER EFFICIENT was the problem. It was solved with the help of a Fenwal heavy duty block THERMOSWITCH® unit. Heat from a 2000-watt source is accurately held at 150F—for top efficiency. Users just plug it in, forget it. THERMOSWITCH unit is attached to explosion-proof block, as shown in diagram.

2. PROTECTING MACHINERY. Engineers wanted to prevent motor damage to automatic brush assembly equipment by starting the operation shortly *before* the sealing compound (pitch) reached the liquid stage. Upon Fenwal advice an inverse type THERMOSWITCH unit was installed to close circuit when pitch temperature reaches 180F. Circuit opens *only should* pitch heaters fail.



3. COOLING PRINTING PLATES. If printing plates cool too fast, they shrink — if too slow, they become porous. Reject plates were practically eliminated when a solenoid water valve was substituted for a hand valve — with a Fenwal THERMOSWITCH unit guarding the water temperature closely and operating the valve whenever the set point was passed. THERMOSWITCH shell itself "senses" change.

4. FREE CATALOG brings you complete data on the unique THERMOSWITCH unit. More details on problems discussed here if you want them. Fenwal engineers are always glad to help on special temperature control problems involving heat, humidity, pressure and other variables. Write **Fenwal Incorporated, 61 Pleasant St., Ashland, Mass.**

Fenwal **THERMOSWITCH®**
Controls Temperature — Precisely

USP Warehouse Palletainers cut inventory costs. Contents are always visible for rapid inventory. Hinged front section permits easy access, even when units are stacked. Anything contained by a 2" mesh can be stored more quickly and safely in Palletainers.

Serving industry everywhere!

Warehousing small parts in large quantities? USP Palletainers are the most practical, economical solution for achieving better space utilization plus efficient handling.

Specifically . . . USP Palletainers of the warehouse type offer you amazing versatilities for maintaining warehouse stocks conveniently—with contents always visible for fast, easy selection—plus savings in space—complete stacking safety, ease of transport and shipping. All these, plus the 75% storage space savings made possible by the exclusive "flat-fold" feature.

USP Warehouse type Palletainer features the half-drop end gate for easy access. 2,000 to 4,000 lb capacities.

USP Palletainers have eliminated the guesswork from warehouse parts handling and storage operation. See for yourself how easily they will solve your problems.

UNION STEEL PRODUCTS CO., Albion, Michigan

USP PALLETAINERS

GENTLEMEN:
Please send me complete information on USP Palletainer application.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

☐ Please have one of your materials handling engineers contact me at once.

Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

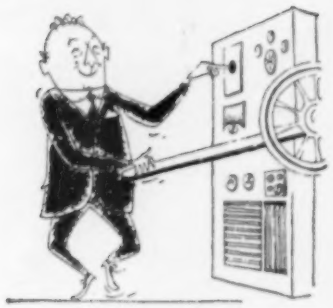
71—Nylon Splice Cap Insulator featuring "snap-on-and-lock" design is easy to install, even on flexible wires. Eliminates threading, wrapping, twisting; loosening in service. For building wire to 600 volts, fixtures to 1000 volts. *Buchanan Electrical Products Corp.*

72—Wall-to-Wall Lighting is for new or old buildings; any ceiling, regardless of irregularities. Leveling feature saves installation time. Framed modules provide relief from monotony of unbroken expanse. Three intensities. *Smithcraft Lighting Div.*

73—Relays are for fans, circulators, other forms of control where relays only are desirable, and independent source of relay-coil voltage is available. RF Series is available in relay only, relay on insulating base, relay on steel base, relay in case. *General Controls Co.*

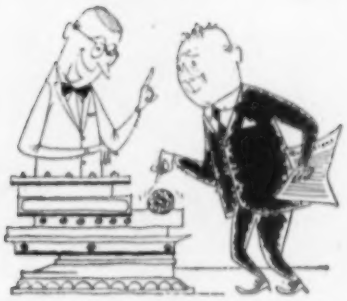
Turn the page

Push the button... pull the handle...



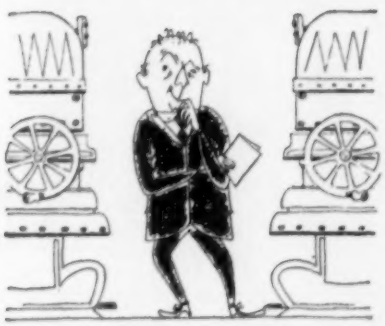
Try out . . . personally . . . the products you need to make your plant more efficient. More than 400 exhibitors of machines, services, supplies, materials and equipment for plant maintenance and engineering will show you new developments, new techniques.

Ask the question... get the answer...



No time delay . . . immediate technical answers to solve your specific, unique problems. Talk directly to the sales engineers and technical experts, in an atmosphere of their products . . . all in one place, at one time, under one roof.

See one... compare another...



Make your choice . . . right on the spot . . . you can see, touch, and try out competitive products side by side. The comparisons and decisions you can make in just four days will enable you to do a better job in your plant.

7th *National*

PLANT MAINTENANCE & ENGINEERING SHOW *& Conference*

January 23 to 26, 1956

Convention Hall, Philadelphia

Write for free tickets to the show and information about the Conference to:

Plant Maintenance & Engineering Show
Clapp & Poliak, Inc.
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Attend the Conference too!...

Hear the experts . . . top men in their fields . . . discuss topics of major interest to plant maintenance and engineering executives. There's no other way to get so much information for so little investment.

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HARTFORD
Custom Built
VACUUM EQUIPMENT

MACHINE DESIGN
A vacuum line leads into a brush making machine to collect the end of bristles after they are trimmed.

The special applications of Spencer Vacuum are unlimited. The vacuum unit is frequently built in as an integral part of the original machine design.

Our engineers will be glad to work with you on any special problem. Ask for Bulletin 155.

CLEANING PELLET DIES
Vacuum automatically cleans the dies of machines that make pellets, at the rate of millions a day.

A VACUUM CHUCK
Vacuum holds down rubber patches under motor driven wire brushes.

ON WHEELS
Combination vacuum and pressure conveyor for handling rock salt and attapulgus clay.

REMOVING WAX
Wax threads are picked up from recording disks.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT
SPENCER
HARTFORD

499-C

FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products circle item numbers on Reader Service card next to back cover.

74—Infra-Red Radiation Pyrometer is for remote temperature measurement of moving objects in a process; location of hot spots in inaccessible equipment. Where there's a line of sight, measures without direct contact or interruption of process. *Servo Corp. of America.*

75—Load-Break Switch, air-insulated, has rating of 500 operations interrupting 100 amp. at 15 kv., continuous current rating of 600 amp. Meets NEMA standard of 40,000 amp. momentary and 25,000 amp. for four seconds. Minimum space. *Westinghouse Electric Corp.*

76—Motor Controls are equipped with "Dual Seal" coils, completely encased within molded modified epoxy resin, which resists combustion, moisture, fungus, temperature, rough handling. And also withstands temperatures of –90 to +250 deg. F. *Furnas Electric Co.*

Turn the page

JOB PROVED

GERLINGER MAKES SHORT WORK OF LONGEST BEAMS EVER LAMINATED

Timber Structures benefits day-in, day-out, by Gerlinger cost-cut handling. Longer wheelbase and larger tires on fork lift truck insure positive maneuverability at all times regardless of adverse weather conditions, load variance.

Timber Structures management and operators alike praise Gerlinger. The plant keeps 5 fork lift trucks and 3 material carriers busy inside and out every shift. Individually, or as a team, Gerlinger heavy-duty material handlers lead the field.

Fleet of 8 Performs "MIRACLES" in Versatile Operations for Timber Structures, Inc., Portland, Ore.

"When it's a big job in a hurry... and safety is a prime factor... we've come to depend more and more on our Gerlinger equipment!" Timber Structures' Gerlinger fork lift trucks gave emphatic demonstration of these words of Mr. R. W. Mayer, assistant general manager, in a dramatic undertaking which involved loading of five colossal beams for delivery in Washington.

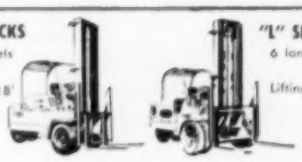
And just why is a Gerlinger fork lift truck able to make routine work of picking up and loading on truck and dolly unwieldy 104-foot laminated beams, each containing 10,164 board feet of lumber and each weighing between 16,000 and 17,000 pounds? Exclusive counter-active weight distribution is part of the answer where variance in load weights and dimensions are concerned. A Gerlinger won't teeter, or back wheels dig in... 54% of truck's weight is where it's needed... over front wheels... for maximum traction and easy maneuverability. Fingertip-controlled boom action... another Gerlinger exclusive... actually "floats" loads... any size or off-size... up and onto truck, dock, or pile.

"Get on the beam"

Get on the "beam"... get the Gerlinger answer to the particular material handling problem facing your industry. Call your Gerlinger distributor now... he will be glad to prove that Gerlinger can save time, money and manhours for you, too. No obligation, of course.

GERLINGER PRODUCTS

"S" SERIES FORK LIFT TRUCKS
5 short wheelbase (106") models
4 to 8-ton capacity
Lifting heights from 10' up to 18'



"L" SERIES FORK LIFT TRUCKS
6 long wheelbase (130") models
6 to 11-ton capacity
Lifting heights from 10' up to 24'

GERLINGER CARRIER CO., DALLAS, OREGON

FAIRLESS WORKS uses DIAMOND INDUSTRIAL TV to Improve Operation and Cut Costs

Arrow points to Diamond ITV camera (in protective housing) used to watch slab positioning.

Four **slab reheating furnaces are charged by *one* operator using Diamond ITV at Fairless Works of the U. S. Steel Corp. Slabs are aligned properly eliminating danger of serious damage to furnaces. Operating costs are reduced.**

You, too, probably can use Diamond ITV to substantial advantage. For case histories and suggestions, get in touch with your Graybar Distributor or use the coupon below.

Operator at pulpit SEES on the Diamond ITV screens when slabs are in correct position for charging two end furnaces.

Camera

Monitor

7258

Distributed by GraybaR ELECTRIC COMPANY

DIAMOND POWER SPECIALTY CORP.
"FIRST IN INDUSTRIAL TELEVISION"
ELECTRONICS DEPT., P.O. BOX 56D
LANCASTER, OHIO

Please send me without obligation a copy of new bulletin showing how Diamond Industrial (Wired) Television will help me reduce costs, improve quality, increase sales and aid safety.

Name_____

Title_____

Company_____

Address_____

FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

77—Fork Lift Truck equipped with TowmoTorque Drive automatically supplies correct torque to drive wheels as required by changing operating conditions. Eliminates gear-shifting delays; dependable performance in all conditions. Unloader attachment. *Towmotor Corp.*

78—Engine Hour Meter is a direct-reading instrument. Shows at a glance total number of hours an engine has been operating; indicates tenths of hours. Rotating disc shows meter is in operation. Registers to 10,000 hours, then returns to zero. *John W. Hobbs Corp.*

79—Centrifugal Pumps, self-priming, are made of corrosion-resistant alloy applicable where highly corrosive liquids are used. Suitable for sump pumping, tank car unloading, other jobs where air or vapor handling capacity is required. Three sizes. *Worthington Corp.*

Turn the page

FOR REMOTE CONTROL OF LIQUID LEVEL AND DIFFERENTIAL-USE

ALCO 908 electronic LECTRO-LEVEL

Just set the dials for accurate control of liquid level. For all refrigerants and all non-corrosive liquids with specific gravity of 0.5 or more. Request bulletin 908.

hold liquids **LEVEL** with **ALCO CONTROLS**

on flooded evaporators, shell and tube coolers, and large receivers

operate sump pumps, alarm bells, and other electrical devices

FOR FIXED LEVEL CONTROL USE

ALCO J-5 FLOAT SWITCH

Holds liquid level within ⅛" differential. Only two major parts. Easy to install and service. For all refrigerants and all non-corrosive liquids with specific gravity of 0.6 or more. Write for bulletin 175-1.

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SEE YOUR ALCO WHOLESALER

ALCO VALVE CO.

1133 KINGSLAND AVE. • ST. LOUIS 5, MO.

Designers and Manufacturers of Thermostatic Expansion Valves, Evaporator Pressure Regulators, Solenoid Valves, Float Valves, Float Switches.

6769

100,000 Satisfied Customers

Keep Plants Clean, Safe, Productive

with

INVINCIBLE Vacuum Cleaners

Of the more than 100,000 Invincible Industrial Vacuum Cleaners now in use, over 5,000 have been in service for 25 years or longer.

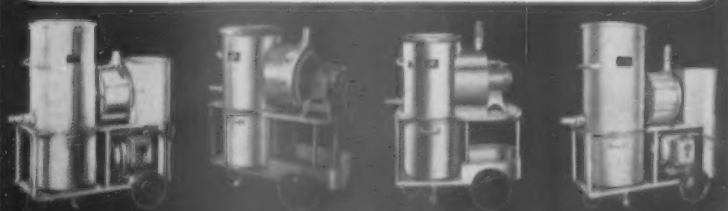
In factories, offices and warehouses, Invincibles are the key to good housekeeping, healthful working conditions and more production. They're ruggedly built to give years of trouble-free service and low maintenance cost.

Invincibles also do an excellent job of reclaiming and conveying scores of industrial materials other than dust and dirt.

SEND FOR BOOKLET—It tells about the thousands of Invincibles now in service.

INVINCIBLE VACUUM CLEANER MFG. CO.

DOVER, OHIO



Model 809-B —5 H. P. Dirt Capacity, 3 cubic feet

Model 460— 1½ H. P. Dirt Capacity, 3020 cubic inches

Model 450— 1½ H. P. Dirt Capacity, 3020 cubic inches

Model 700— 7½ H. P. Extra Heavy Duty

FACTORY / EQUIPMENT NEWS

Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

80—Pallet Hand Truck, hydraulic, is lightweight, easy to maneuver. Tubular steel frame construction decreases weight, but gives more strength per lb. Model A lifts pallet 4 in. with 9 easy foot-pedal strokes. Can be built for pallets 30-72 in. *Yale & Towne Mfg. Co.*

81—Welders' "Ground Hog" makes positive ground to any shaped object quickly, securely. Built-in magnets hold it in any position. Aluminum body enables improved electrical contact; ground remains cooler. Pole faces 3 sides. Holds small pieces. *Magne-Cast Tool Co.*

82—Work Glove for handling rough metal castings and similar materials. Extra-heavy coating of neoprene increases wearability; is highly resistant to acids, greases, fats, oils. Flexible—despite coating. Knit-wrist style; two gauntlet lengths. *B. F. Goodrich.*

Turn the page

Mobile power. With power take-off, the 4-wheel drive Universal 'Jeep' operates welders, generators, compressors, and many other types of industrial equipment. It can also be equipped with mowers, snow plows, grader or dozer blades or a trencher.

On job after job... 'Jeep' vehicles save you time and money!

Hauling. With the extra traction of its 4-wheel drive, and a special low gear range when needed, the Universal 'Jeep' hauls heavily loaded trailers around the factory yard or inside factory buildings.

Yard maintenance. The 4-wheel drive 'Jeep' Truck carries loads over a ton, tows trailers many times its own weight, and with power take-off operates a wide variety of industrial equipment.

"Go-anywhere" 4-wheel drive 'Jeep' family vehicles spread their cost over a wide variety of factory jobs, from carrying repair parts to supplying transportation around the plant or between plants. They travel in conventional 2-wheel drive on hard, smooth surfaces, and shift easily into 4-wheel drive when the going is tough, on or off the road.

With their low initial cost, low maintenance and long life, versatile vehicles in the 'Jeep' family can save you money in almost any industrial operation. It will pay you to write for information or get the facts from your Willys dealer.

The 'Jeep'® family of 4-wheel drive vehicles

WILLYS... makers of the world's most useful vehicles

WILLYS MOTORS, INC., TOLEDO 1, OHIO

Front-side brushes retract, automatically, upon striking an object.

AMERICA'S MOST MODERN INDUSTRIAL SWEEPER

HYDRA-SWEEP SETS A NEW HIGH IN EFFICIENCY AND A NEW LOW IN SWEEPING COSTS.

The unique design and exclusive features of Hydra-Sweep are of prime importance to top management of industrial plants, warehouses, airports, parking lots—any place where areas require fast, low cost sweeping. Performance—A single Hydra-Sweep can cover 150,000 sq. ft. per hr.—saving from 60 to 75 man hours—every working hour.

Exclusive Operating Features—Hydraulic drive and controls from driver's seat. Adjustable sweeping width 30" to 61". Constant broom speed, independent of traveling speed, through full range of 0 to 8 MPH . . . 19" front—side brushes sweep flush to right or left walls . . . Full-floating brooms. . . 14 H.P. air-cooled engine is fire protected . . . all mechanism easy to service. Dirt hopper, heavy steel, front dump 10 cu. ft., opened and closed by hydraulic power from driver's seat . . . and many other exclusive features. (Patents Pending).

GET THE FACTS—ASK FOR COMPLETE ILLUSTRATED FOLDER

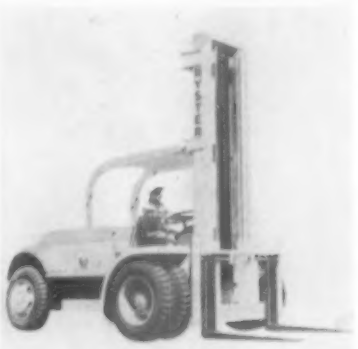
WRITE OR WIRE

INDUSTRIAL SWEEPER COMPANY

2508-18 SOUTH MAIN STREET • SOUTH BEND 23, INDIANA

Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.



83—Lift Truck has capacity of 20,000 lb., yet is compact (166½ in. long, 94 in. wide) and maneuverable. Convenient, easy-to-operate controls and good visibility give driver "feel" of operation in all weather conditions. Stable and rigid under loads. *Hyster Co.*

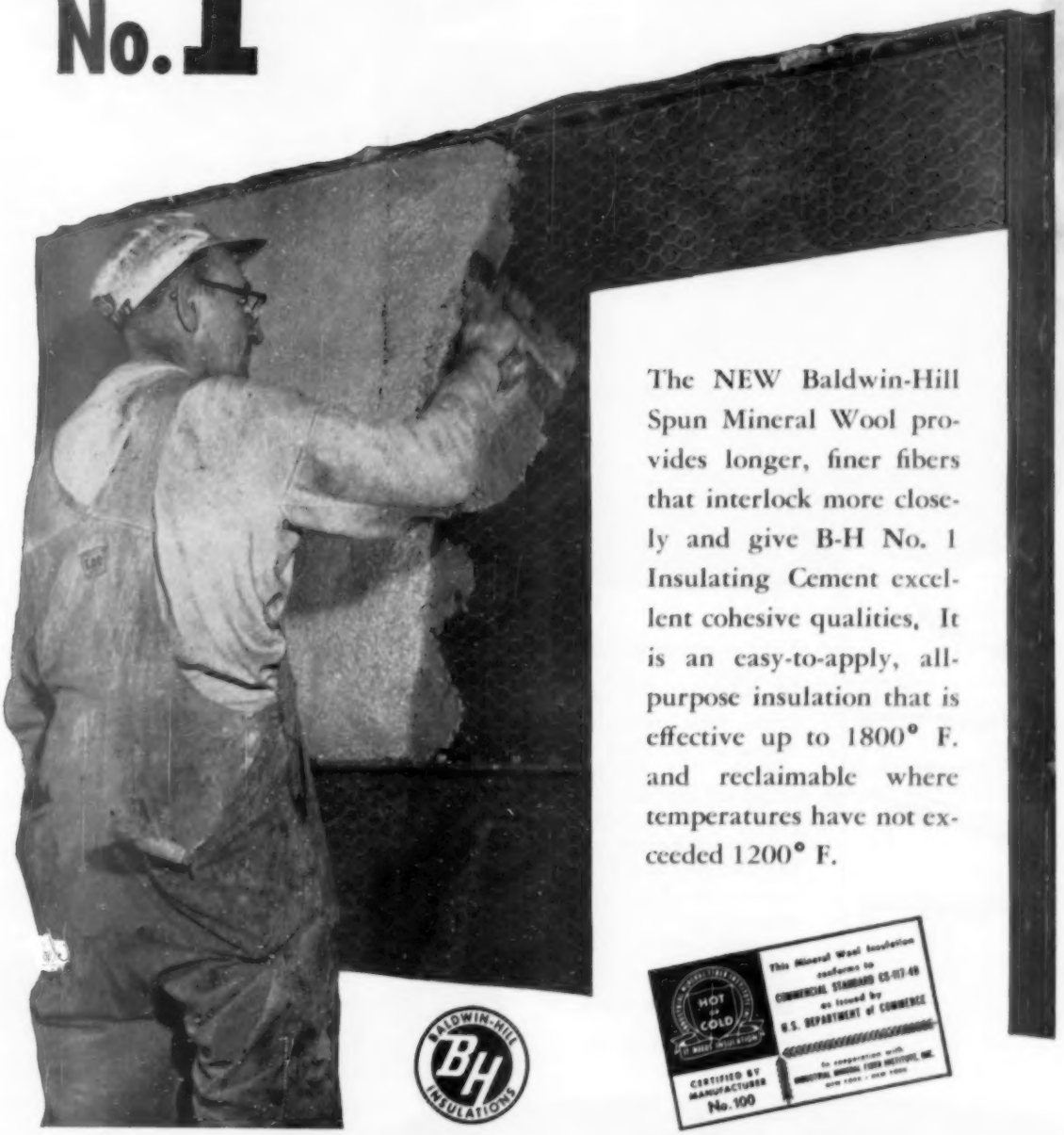
84—Torque Analyzer for power screwdrivers gives fast, accurate direct reading. Indicates area of trouble in defective tools without disassembly. Cuts tool maintenance, as it's easy to determine whether tools are operating below minimum efficiency. *Richmont, Inc.*

85—Diaphragm Valve enables straight-through flow of viscous materials, fibrous slurries, sludges, semi-fluids, solids in suspension, without restriction or stoppage; with minimum pressure drop. Self-draining; rodding or brushing without removal of bonnet. *Grinnell Co.*

Turn the page

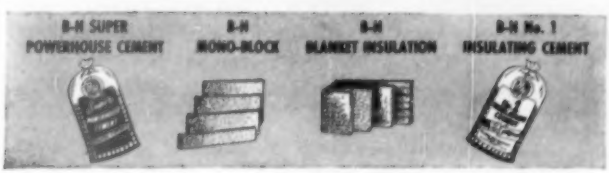
Holds together better than ever . . .

BALDWIN-HILL No. 1 INSULATING CEMENT



The NEW Baldwin-Hill Spun Mineral Wool provides longer, finer fibers that interlock more closely and give B-H No. 1 Insulating Cement excellent cohesive qualities. It is an easy-to-apply, all-purpose insulation that is effective up to 1800° F. and reclaimable where temperatures have not exceeded 1200° F.

BALDWIN-HILL INSULATIONS



BALDWIN-HILL COMPANY

501 Breunig Ave. Trenton 2, N. J.

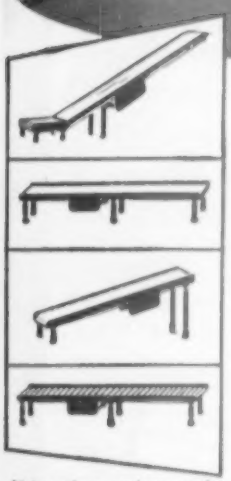
Kalamazoo, Mich. Huntington, Ind. Temple, Texas

Often you can

DO IT YOURSELF

at a Saving!

Testing of air conditioners is simplified by Roller Conveyor line in rear. Units then travel via Adapto Belt Conveyor in foreground to packing and shipping.



Using these various stock-size Adapto Units, plus stock-size Roller and Wheel Conveyor Sections, a worthwhile conveyor installation frequently can be effected at savings in both cost and time.

Make your own conveyor layout and installation! In many instances this is possible and at a saving to you, with Logan standardized conveyors known as Adapto Units. These units can be bought virtually "off the shelf," are shipped promptly and are surprisingly low in price. Write for Adapto Booklet, covering pre-engineered stock-size parts for Belt and Live Roll Conveyors. A comprehensive handling system often can be effected right in the field, with your own maintenance crew. Write for booklet today.

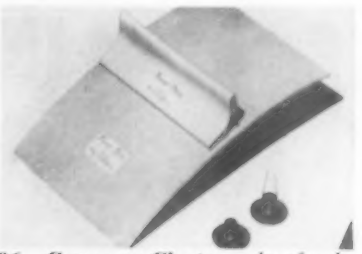
LOGAN CO., 510 CABEL ST.
LOUISVILLE 6, KY.

Logan Conveyor

Write to Adapto Unit Booklet No. [illegible]

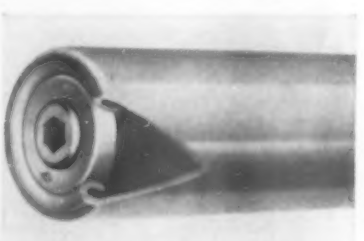
ADAPTO UNITS

For more about these products, circle item numbers on Reader Service card next to back cover.



86—Conveyor Cleats made of rubber solve problem of conveying loads up steep inclines. Attach to any belt by molded rubber rivets. Install on old or new belts fast and easily; not necessary to remove belt from conveyor. Two widths, lengths to fit. *Holz Tire & Rubber Co.*

87—Winch Attachment, available on 2000- and 4000-lb. capacity "MultiMaster" electric fork trucks, speeds freight handling. Winch is operated by simply raising forks, permitting handling while truck is stationary. Ideal in crowded areas. *Lewis-Shepard Products, Inc.*



88—Integral-End Conveyor Roller eliminates roller-caused damage to products, packages, cartons; jamming and tie-ups. Roller is mounted on self-contained ball bearings; bearings are housed in ends, which are rolled inward for smooth, rounded surface. *Alvey-Ferguson Co.*

Turn the page

Here's the story...

ON Century 's

NEW SMALLER, BETTER MOTORS 1 TO 30 H.P.

In this revealing book, Century shows how and why the *New Standard*, smaller motors actually outperform the larger, heavier Old Standard models.

These trim, compact "*New Standards*" give you weight savings up to 40% . . . plus space savings and easier installation. Dead weight and dead air space are eliminated. The "active materials," such as iron and copper, are designed to give greater efficiency than ever before. New synthetic insulating materials give greater dielectric strength and uniformity.

SEND FOR YOUR *PERSONAL* COPY OF THIS VALUABLE DATA BOOK...!

Mail this coupon today!

To CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Mo.

Please send New Bulletin 6-1P1 to:

Name..... *Title*.....

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Performance Rated©
MOTORS
1/20 to 400 H.P.

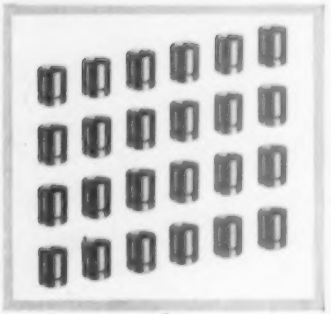
CENTURY ELECTRIC COMPANY

49

1806 Pine Street • St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*

got a tool problem?

LOOK HOW *Snap-on* TOOL SPECIALISTS CUT SOCKET BREAKAGE 20-FOLD FOR INDUSTRIAL FIRM



problem:

A large Milwaukee industrial concern was breaking an average of a socket per day on nut-running jobs handled with high-cycle nut runner. This not only meant tool replacement expense, but even more important, a loss in production time.

R. J. RIPPLE

solution:

The problem was turned over to a *Snap-on* tool sales engineer, R. J. Ripple, who went over it in detail with his factory laboratory experts. They found that the socket used was not designed to handle the type of work involved. A new, special heat-treated socket was developed to meet the job requirements. Now socket breakage is less than one a month, lost time is negligible.

WHAT IS YOUR PROBLEM?

If you have a production or maintenance problem involving special tool design or application, or any other question on tools, talk it over with your *Snap-on* man. He is a specialist who devotes all his time to industrial application of *Snap-on* tools. Write us or call your nearest *Snap-on* branch. Free catalog of industrial wrenches and hand tools is yours for the asking.

SNAP-ON TOOLS CORPORATION
8044-A 28th Avenue, Kenosha, Wisconsin

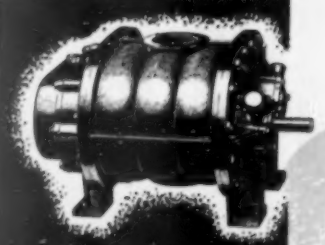
*Snap-on is the trademark of Snap-on Tools Corporation.

For more about these products, circle item numbers on Reader Service card next to back cover.

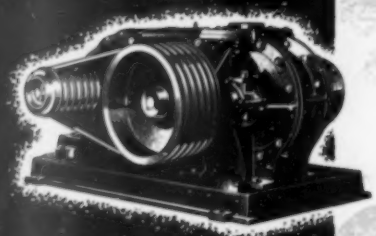
89—Portable Gasoline Drain Tank facilitates safe, convenient emptying of fuel tanks. Swivel casters, waist-high handle, 18-in. height all make movement and positioning easy. U-L approved transfer pump empties 5 gal. per min. Tank holds 25 gal. *Protectoseal Co.*

90—Floor Drills, 2-in. stationary head, are designed for operator comfort and pleasing appearance. Shipped with motor and controls, ready to operate soon as power leads are connected. Equipped with power feed. Features simple selector. *Cincinnati Lathe and Tool Co.*

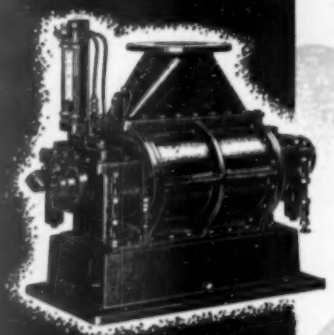
Turn the page



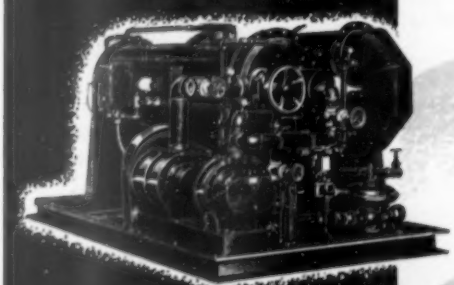
BLOWERS for such widely varying needs as lifting a damaged airplane or injecting air into water to provide oxygen for safe transportation of fish in tanks. Capacities as low as 5 cfm or up to 100,000 cfm or higher.



GAS PUMPS for inflating balloons, manufacturing electronic tubes or extracting gases from contaminated areas for test samples. They'll deliver as little as 5 cfm or as much as 50,000 cfm or more.



METERS help save money or make more profits by accurately measuring almost any kind of gas which you buy, sell or use in manufacturing processes. "Cash register accuracy" from 2,000 to a million cfh.



INERT GAS GENERATORS make hazardous operations safer from fire or explosion. They protect people, plants and products . . . and often return more than they cost in reduced insurance premiums. They'll produce inert gas for almost any use. You can have as much as 50,000 cfh or as little as 1,000 cfh in mobile or stationary equipment.

How to pull DOLLARS out of the AIR

New ways to put air (or gas) to useful, profitable work are constantly being developed by engineers and designers. These result in more effective machines and devices—frequently replacing slower or more expensive methods—often reducing the first cost of the equipment itself. These results are accomplished . . .

by resourceful engineering

In many of these applications, designers and engineers have utilized standard R-C equipment, sometimes with special adaptations. The problem may call for a small or large volume of air, moved by R-C Blowers or Exhausters. It may require vacuums, produced by R-C Vacuum Pumps. Perhaps metering or pumping of gas is needed, also met by R-C products. In any event, the solution is often . . .

aided by Roots-Connersville experience

If you use or build for resale any product which might be improved by utilization of air at moderate pressures, by vacuums or by moving gas, perhaps we can help you. Even if you have only the ghost of an idea that might pull dollars out of the air, we'll gladly work with you.

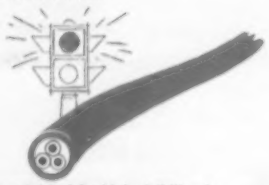
Just address:
Product Development Manager, Roots-Connersville Blower Division, 156 Central Ave., Connersville, Indiana.

ROOTS-CONNERSVILLE BLOWER
ONE OF THE DRESSER INDUSTRIES

injects color in portable cord to minimize accidents ... cut maintenance costs!

Indoors or outdoors...Type MD* RED-D-PRENE carries current wherever you want it, *safely* and at *lower* cost. First designed with tough, oil-resistant Neoprene sheath in Industrial Red... easily seen and recognized by maintenance men. RED-D-PRENE assures long wear, reduces maintenance costs. Means positive identification in your stockroom. Ideal for heavy duty use in Mill and Plant installations.

No flat sides, no off center conditions! Maximum flexibility, moisture resistant.



Industrial Red for high visibility; insures positive RED-D identification!

Write today for new descriptive brochure and samples.

Trade Mark

DIAMOND WIRE & CABLE CO.

SYCAMORE, ILLINOIS

Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

91—Power-Driven Wire Brush eliminates hand wire brushing of structural steel before painting. "Speedlix" is just guided wheel-barrow fashion. Saves time and money. Takes heavy abuse. Eleven 1½-in. brushes combine to needed width. *Independent Iron Works.*

92—Portable Metal Cutter folds like an umbrella; allows you to carry the tool to the job. "Metal King" cuts any size sheet metal; to 10-gage mild or stainless steel, as well as plastic, neoprene and asphalt tile, aluminum, extrusion cables, wood. *Airborne Sales Co.*

93—Nylon Tube Fittings can be used with plastic or metal tubing; with stainless steel tubing, provide savings to 90% compared to stainless fittings. Impervious to most acids and alkalis; withstand –70 to +250 deg. F., 150-500 psi. *Imperial Brass Mfg. Co.*

Turn the page

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

New NEMA Frames
Standard and Explosion-proof

Type EP
215 Frame

Wagner Totally-Enclosed Fan-Cooled Motors

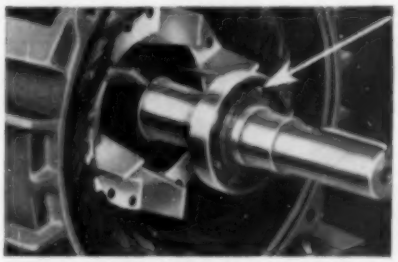
cut maintenance time and costs

Check the features of the new *Wagner Type EP Totally Enclosed Motor*. They spell the difference between needless expenditures in maintenance time and costs . . . and a definite savings in motor upkeep and repairs. You'll find that for general industrial use where dust, dirt, filings, abrasives, steel chips or moisture are present, the Wagner Type EP Motor gives steady, troublefree performance and longer service life.

Wagner Type JP Explosion-Proof Motor . . . has the same quality construction as the Type EP – plus added features which make it completely safe to operate where explosive dust, gases or vapors are present.

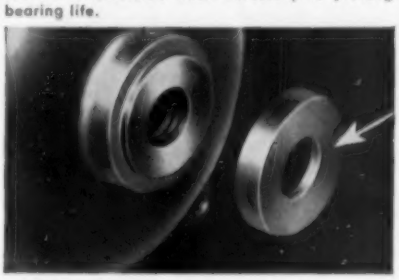
Both Type EP and JP Wagner motors are available in ratings up to 250 horsepower. For complete information, just call the nearest of our 32 branch offices, or write for Bulletin MU-203.

Wagner Electric Corporation
6412 Plymouth Ave., St. Louis 14, Mo.

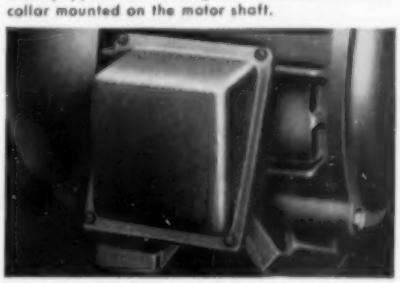


1 HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity provide long, troublefree service.

2 BEARINGS CAN BE RE-LUBRICATED—Wagner motors can be re-lubricated when necessary to prolong bearing life.



3 BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals, a machined collar mounted on the motor shaft.



4 EASY TO CONNECT—Large diagonally-split conduit box provides ample room for making connections. Leads are permanently identified.

5 NO GREASE LOSS—Bearing housings have effective seals to prevent escape of grease.

6 RIBBED FRAME—Ribs on the corrosion-resistant cast iron frames add mechanical strength and increase the surface area for more efficient cooling.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

MSS-18

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS-AIR AND HYDRAULIC

If management could design a business building

Butler buildings cover 185,000 square feet of space—at dramatically low cost, for The Coleman Company, Inc.

it would have these BUTLER features

If management could redesign the "shirtsleeves" buildings of business—factories, warehouses, outlets—everyone would agree that high costs are the first problem—cost of materials, erection, expansion, alteration, maintenance. Butler steel buildings have already solved these problems—and several more besides. Steel and aluminum need little care. Steel clear-span frames make every cubic foot of interior usable. Bolted assembly makes erection quick and easy. Bolted apron walls make expansion or alteration economical. Mass production produces buildings to high quality standards—for about the price you'd pay for cheapest construction.

BUTLER STEEL PRODUCTS

Manufacturers of Oil Equipment
Steel Buildings • Farm Equipment
Dry Cleaners Equipment • Special Products

Factories at:
Kansas City, Mo. • Galesburg, Ill. • Minneapolis, Minn.
Richmond, Calif. • Houston, Texas • Birmingham, Ala.

For prompt reply address office nearest you.
BUTLER MANUFACTURING COMPANY
Dept. 75A, Richmond, Calif.

Please mail more information on Butler steel buildings.

Name_____

Address_____

City_____ State_____

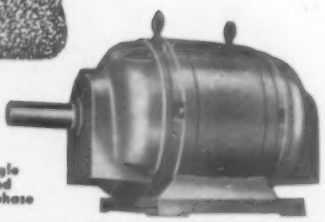
FACTORY / EQUIPMENT NEWS
Begins on page 142

For more about these products, circle item numbers on Reader Service card next to back cover.

94—Tilting Arbor Saw, 10-in. circular bench model, is an ideal large-capacity, low-cost, portable "second" saw for small woodworking shops. Cuts stock up to 3⅛ in.; weighs slightly over 2000 lb.; operated by 1-hp. motor. *Delta Power Tool Div., Rockwell Mfg. Co.*

95—Sealant Gun uses disposable cartridges and nozzles of "Tenite" polyethylene. When sealant is exhausted or job completed, parts can easily be discarded to eliminate cleaning time and costs. Polyethylene does not react with or affect properties of caulking compounds. *Pyles Industries, Inc.*

CUSTOM-BUILT—
NOT CUSTOM PRICED



Single and Polyphase

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

Write for Complete Details Today

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FLUXES for SOLDERING BRAZING WELDING
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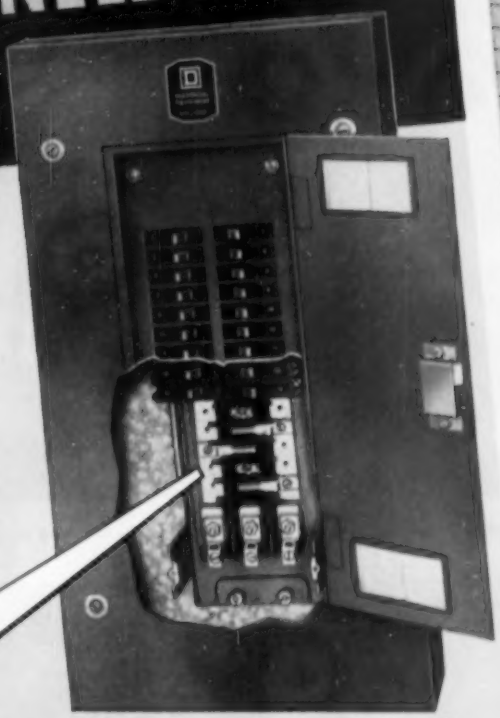
BOWERS BATTERIES
Always Better
BOWERS BATTERY & SPARK PLUG CO., READING, PA.

Terrific!

NQO LIGHTING PANELBOARD *with* QO... FINEST BREAKER EVER BUILT!



...Get the complete line "Off-the-Shelf" from your Electrical Distributor or have assembled panels shipped right to the job

It's a top quality line throughout! Note the compact, streamlined beauty. A closer look reveals such outstanding features as: Distributed phase bus arrangement with clear identification for simplified load balancing. Adjustable, indicating trim clamps. Galvanized box with large gutters for real accessibility, yet compact enough to mount between 16" wall studs. Most important of all—the new NQO panelboard offers you the finest breaker ever built, with exclusive **SWINGRIP** mounting.

NEW QO BREAKER
with Exclusive SWINGRIP mounting

No other breaker has all these features which make QO the finest breaker ever built!

- Plug-In for maximum flexibility as well as ease of installation and maintenance.
- Quick-make, quick-break mechanism provides positive operation, has excellent "feel". Assures positive operation and long life under all circuit switching conditions.
- Compensated thermal trip enables breaker to carry full allowable load under varying ambient temperatures.
- Sensitive calibrated magnetic trip assures quick and consistent response to harmful overloads or short circuits.
- Non-interchangeable design discourages the use of 30, 40 and 50 ampere units where 15 or 20 ampere breakers have been installed.
- Trip indication on overload or short. Handle moves to middle position.
- Positive action of handle against contact members guarantees circuit opening.
- Compact design—¾" width for each pole conserves valuable space.
- Exclusive **SWINGRIP** mounting provides easier installation, automatic alignment, positive contact with bus bars.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Inverted, Republic Stacking Racks permit long lengths of tubing to overhang without dragging on floor. They also serve as work tables during fabricating.

PR-15 Racks are easily stacked to practical heights regardless of the bulky material they contain.

Mounted in normal position on steel dollies, racks provide ease of movement of tubing from one operation to another.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

How Republic stacking racks help solve a "Hang-over" problem

Franklin Products Company, Franklin, Michigan, manufactures automotive and aircraft fuel and hydraulic lines in varied lengths up to ten feet. Republic Stacking Racks, used in their normal position mounted on steel dollies for mobility, are ideally suited for handling coils and shorter lengths of tubing. However, the longer lengths, bent at sharp angles, present a problem. The tubing frequently has too much overhang for the racks in their normal position and as a result the tubing drags on the shop floor.

To solve this "hangover" problem, Franklin Products have simply inverted the racks on the dollies. The height gained provides plenty of room for overhang and prevents the tubing from dragging on the floor. This double usage of Republic Stacking Racks speeds both handling and fabricating. It has resulted in several other advantages. In the inverted position, the racks serve as work tables during the various tube fabricating operations and at a comfortable operator height. They are also used for transporting tubing from one operation to another.

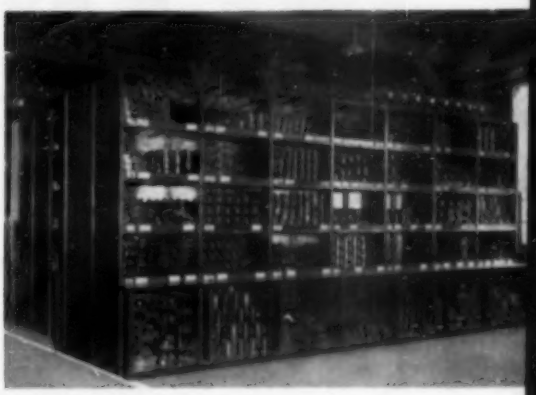
In conventional use, Republic PR-15 Stacking Racks are especially adaptable to packaged materials that do not require the use of sides. Construction features permit easy entry by fork or platform truck. Sides and bottom corners are designed to permit stacking of racks to any practical height either loaded or unloaded.

Give you an idea for your shop or plant? Then contact your Republic Materials Handling Equipment Dealer. He has all the facts on PR-15 Stacking Racks or on the many other types of materials handling equipment made by Republic's Pressed Steel Division. Or write us for more information.

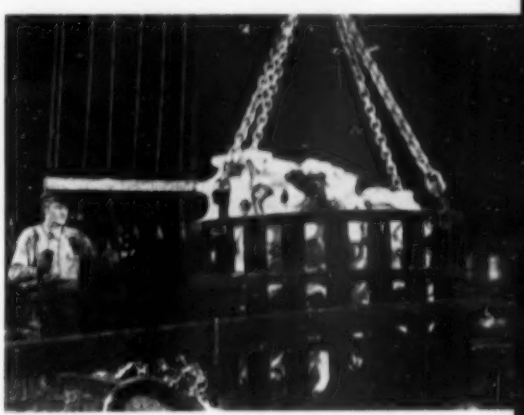
STEEL

and Steel Products

Here are More Problem-Solvers from Republic



WEDGE-LOCK STEEL SHELVING made by Republic's Berger Division provides maximum loading in minimum floor space. It's designed for high stacking of heavy items with no sagging, swaying or buckling. Joints actually get tighter as weight increases. Wedge-Lock Steel Shelving is completely flexible. It can be assembled quickly and easily. Write for literature and full information.



CHAIN SLINGS, ATTACHMENTS AND ACCESSORIES are supplied by Republic's Chain Division in Alloy Steel, High Test Steel and Wrought Iron. They provide an exceptionally high degree of safety in numerous handling operations. All Republic Chain Slings are proof tested and warranted to meet or exceed specifications. They are made in any length to meet your requirements. Write for new catalog.

REPUBLIC STEEL CORPORATION
3140 East 45th Street, Cleveland 27, Ohio

Please send more information on:

☐ PR-15 Stacking Racks ☐ Chain Slings
☐ Wedge-Lock Steel Shelving

Name_____ Title_____

Company_____

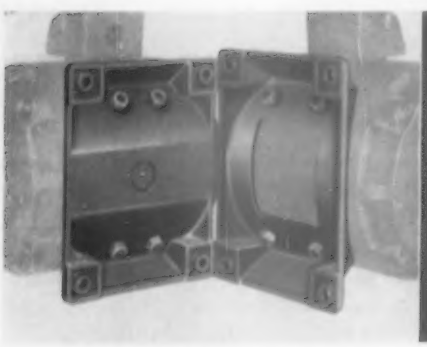
Address_____

City_____ Zone____ State_____

R-9695

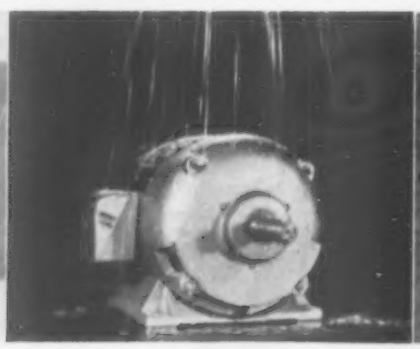
Single-Phase EXCLUSIVE ...totally-enclosed motor switch and actuator... in

You get these quality A. O. Smith motor features...



OPTIONAL FRAME MOUNTINGS

There's no need to change product design to use new NEMA frame sizes. A. O. Smith gives you frame mountings drilled to old and new specifications.



DRIP-PROOF CONSTRUCTION

Motor can be mounted in any position . . . drip-proof thru 360° cycle . . . simply rotate end brackets. No foreign matter can enter vent holes.

PRE-LUBRICATED BEARINGS

Shielded bearings assure protection against over greasing . . . provide even load distribution under all working conditions . . . quiet operating.

A. O. Smith integral hp motors

* Always clean
* Easy to service

THE secret of the totally-enclosed switch assembly is a sealed pocket in the end bell of the motor . . . a recess designed specifically to house the entire switch and actuator assembly. The pocket is then sealed with a cork-lined cover to prevent any type of dirt, dust or other foreign matter from *ever* coming in contact with these critical parts.

Service is a cinch. Because of the proven simplicity of the A. O. Smith switch design, service, even without the separately sealed feature would be practically nonexistent. Each switch is individually adjusted to the precise setting for long life and best electrical performance. As a result, it's almost impossible for contacts to burn out.

When you specify A. O. Smith integrals, you get motors that are application-engineered to match your particular product design. There's no need to adapt your product to the design limitations of conventional motors.

And remember — for your design or speed requirements, there's an A. O. Smith integral hp motor available to power your products. Integrals are built in a single-phase (1 thru 7½ hp) and polyphase (1 thru 150 hp) . . . in various speeds and frequencies . . . choice of frame mountings for either old or new NEMA dimensions . . . C and D flanges or special flanges as required.

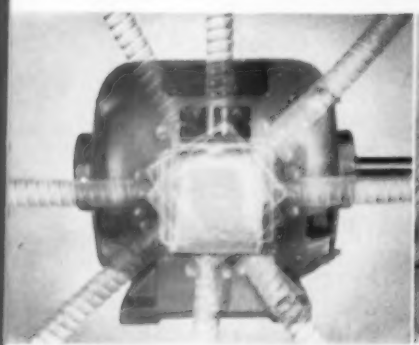
Produced by one of America's great industrial concerns, these motors are backed by a national network of 270 strategically located factory service stations. There's one near you—ready to provide 24-hour service on all parts and service orders.

For more information on A. O. Smith integral hp motors, write for new Bulletin No. EM156.

Through research A.O. Smith *. . . a better way*

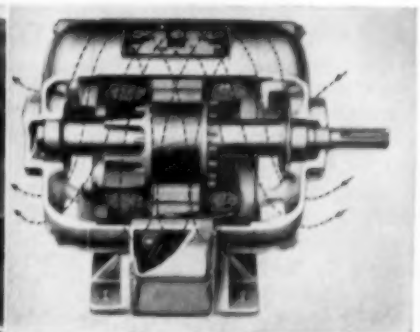
A.O.Smith
CORPORATION
ELECTRIC MOTOR DIVISION
TIPP CITY, OHIO
International Division: Milwaukee 1, Wisconsin

application-engineered to match your product requirements



FULL-ROTATING CONDUIT BOX
Can be set at any angle. Designed to save motor space and speed installation. Loosen only three screws to rotate conduit base.

DYNAMICALLY-BALANCED ROTOR
Assures continuous, vibrationless, trouble-free performance and maintains long bearing life. Indestructible laminations are high-quality silicon steel.



CONTROLLED THRU-VENTILATION
Cooling system designed for high-volume, low velocity air for maximum heat transfer. Temperature held to absolute minimum, assuring longer insulation life.

FACTORY | LABOR RELATIONS NEWS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc., Member, New York Bar

Court OK's Harassing Tactics

It's not bargaining in bad faith. But employers may discharge workers who engage in such activities.

It was bargaining time. To bring pressure on the company, the Textile Workers Union (CIO) encouraged slowdowns and extensions of rest periods. There were walkouts—or partial strikes. Employees of another company were induced not to work for this employer. The members refused to work overtime. This was not bargaining in good faith, said the company. So did the National Labor Relations Board. But by a split decision, the U. S. Court of Appeals for the District of Columbia ran roughshod over the view of both the company and the NLRB. These activities are *not protected* under the law. That is, employees might well be disciplined for engaging in them, but they do *not constitute bargaining in bad faith.*

The court said: "Courts have held that similar union tactics are 'unprotected,' in the sense that employers may lawfully discharge employees for using them. But until now no court, as far as we know, has been called upon to consider the Board's theory that such tactics are evidence that a union is not bargaining in good faith and may therefore be forbidden. The theory will not stand analysis. There is not the slightest inconsistency between (such actions and) genuine desire to come to an agreement one wants. Aside from some specified conduct, such as jurisdictional strikes and secondary boycotts, we do not find that Congress limited the use of economic pressure for lawful demands."

How did the Board reach its decision that there was bad faith bargaining? It goes back to the Taft-Hartley Act of 1947. This law required unions, for the first time, to bargain in good faith. So when the present case came before the Board, it examined the standards of good faith bargaining applied to employers. But the Federal court, by its split decision, said no soap. If this decision stands, employers will be forced to use the other remedy available to them in this situation. Fire or suspend the violating employees.

Superseniority Kicked Out

Superseniority at Mathieson Chemical Corporation was kicked out. It was discriminatory. It violated the Taft Act, said the National Labor Relations Board. Under this brand of superseniority, Mathieson gave preference in layoffs to workers who either returned to work during a strike — or stayed on the job. Mathieson followed this policy after the union rejected a clause to this effect during a bargaining session following a 3-week strike.

You Can Fire a Dangerous Worker

What an employee does at home is generally of no concern to the boss. But when an employee knifes his wife and mother-in-law, his employer has a right to be concerned. Perhaps enough to warrant discharging the worker. Let's take this ruling:

The workman's compensation insurance company insuring a packing house threatened to cancel its coverage if the company kept employees on the payroll who were likely to engage in dangerous conduct. It seems that several years ago the insurance company had to pay out a fat sum to an employee who was attacked on the job by a fellow-worker with a meat cleaver.

Just a while back, another employee knifed his wife and mother-in-law. He served time for this. When he was released he tried to get his job back, but the company said nix. For justification the company referred to the insurance company's warning and termed him a potential hazard to fellow-workers. The union argued: Take him back. He has paid his debt to society. The offense occurred off the premises anyhow.

The arbitrator didn't see it the union's way. In view of the circumstances, it wasn't improper for the employer to refuse to reinstate the offending employee.

Re-Employment Rights of Reservists

A Federal Court refused to assist a reservist back from training duty in his fight for re-employment rights. No jurisdiction, it said. Secretary of Labor, James P. Mitchell, said that the government will appeal . . . and should it lose, it'll push for a legislative change. But this decision, said Mitchell, does not apply to reservists performing a period of *extended active duty.*

It only applies to a reservist performing training duty whose rights are defined by Section 9(g)(3) of the Universal Military Training and Service Act. But despite the adverse decision, Mitchell expresses the hope that employers will voluntarily give re-employment rights to all such reservists.

And as FACTORY predicted in its October 1955 article, "Reservists —Your Newest Worry," the unions are starting to set up their own bargaining demands for reservists. For instance, the AFL now comes up with its ideas on the subject. Says the AFL to its affiliate unions: Ask your companies for (a) full pay for the entire period of reserve

Self-Powered

COMBINATION SCRUBBER-VAC

Cleans Vast-Area Floors "By the Mile"

Oxy-Catalyst Monoxide Eliminator and Powder Dispenser are accessories

- Cleans up to 16,000 sq. ft. per hour!
- Applies the cleanser, scrubs, and picks up — *all in one operation*
- Mounts a SELF-STARTING gasoline engine

This *all-in-one* cleaning unit, *Finnell's 218G*, is indeed the answer to today's need for increasing output per man-hour on vast-area scrubbing. *The 218G completely mechanizes scrubbing* — applies the cleanser, scrubs, and picks up — *all in one operation!* Independence from power lines permits the machine to go wherever the operator guides it . . . working in and out of production areas with ease . . . *scrubbing continuously.* Thus the *218G* is capable of cleaning up to 16,000 sq. ft. per hour!

Maintenance men appreciate the labor-saving features of this unit. The gasoline engine starts quickly and easily by pressing the starter button (eliminates rope-pulling). And there are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 ft. per minute). Two 18-inch brushes give a 36-inch scrubbing surface. *One engine* (2 cyl., 4 cycle, 9.4 hp., air-cooled) operates all working parts. The powerful vac performs quietly. Gasoline only is used for fuel — no mixing required. *Finnell* also offers this type of machine in a smaller size *(215G-2)* with two 15-inch brushes.

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac*. *Finnell* makes a full range of sizes, including *electric* as well as *gasoline* models. It's also good to know that a *Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

See the Finnell Exhibit • PLANT MAINTENANCE and ENGINEERING SHOW • Philadelphia • January 23-26 • *Space 1501*

Ask Standard ... how to cut costs with conveyors

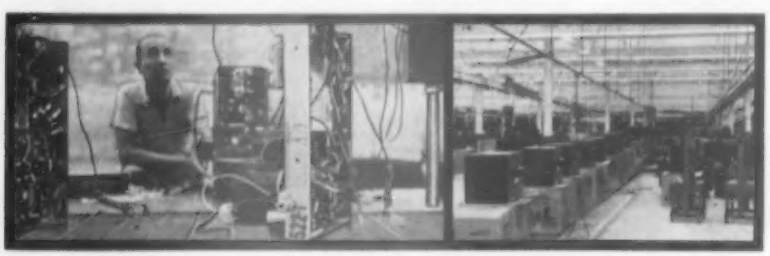
TV chassis move along Standard slat conveyor at right center. Job-tailored design assures uninterrupted, smooth work flow . . . helps manufacturer achieve high degree of automation despite complexity of operations.

Mile-long conveyor system speeds TV production line

IN this TV plant, Standard engineers designed and installed more than 2800 ft. of belt and slat conveyors as part of a mile-long conveyor system.

It's a typical example of how Standard engineers will work with you and your engineers to increase automation, cut costs through more widespread use of conveyors.

And, because Standard produces a wide range of permanent or portable gravity and power conveyors — in roller, belt, slat, chain, wheel push-bar and sectional types — you can be sure their recommendations will be unbiased. When you plan any materials moving system, be sure to call or write STANDARD CONVEYOR COMPANY, General Offices: North St. Paul 9, Minnesota.



Left photo shows closeup of slat conveyor. Note integral electric sockets for circuit testing. At right, completed sets move along Standard wire-mesh floor belt.

Contact the Standard engineer listed in your classified phone book. Or, write for free catalog. Address Dept G-1.

Sales and Service in Principal Cities.

Begins on page 208

training—no offset for military pay; (b) time off in addition to vacation pay; (c) a special deal that will permit night shift workers to attend weekly drills at night; and (d) incorporate the Reserve Act benefits set forth by law in the contract itself—just to make sure.

No Taft-Hartley Changes?

Secretary of Labor James P. Mitchell doesn't see much chance for any changes in the Taft-Hartley Act at this session of Congress. But the administration will press for them. However, extra effort will be exerted to push these proposals through:

. . . *Payment of overtime* after 40 hours weekly to employees on public construction projects.

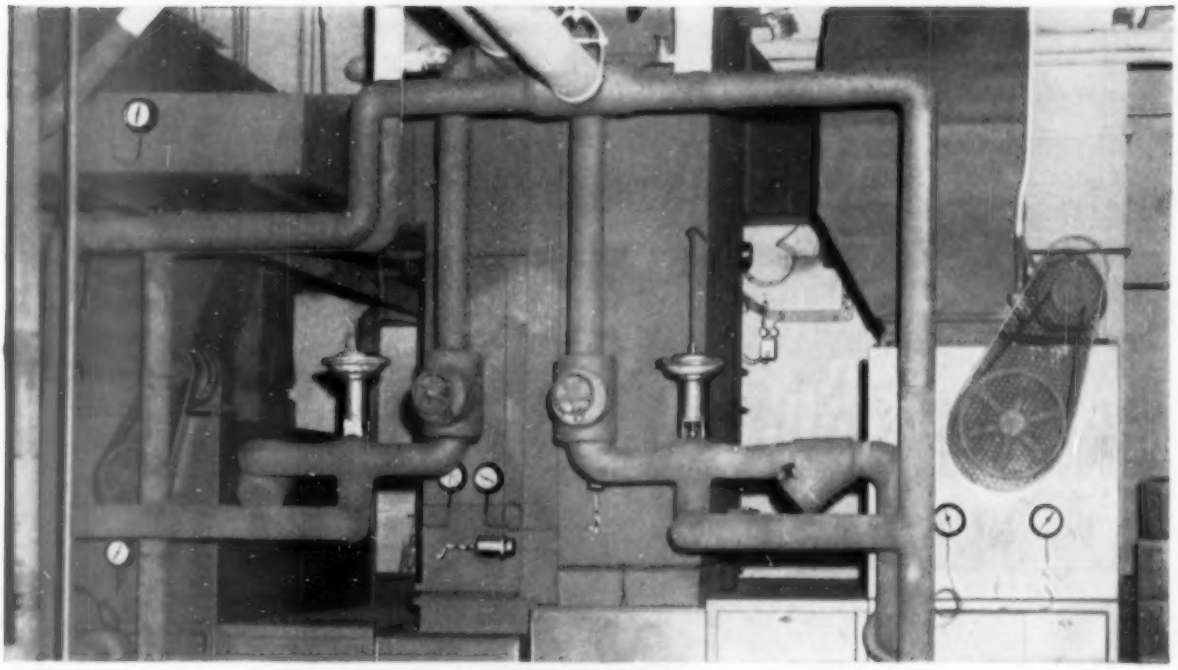
. . . *Financial and technical help* to states for the development of occupational safety programs.

Physical Exams for Recall

Many companies require job applicants to pass a physical exam before being put on the payroll. There is generally no union problem here. Some companies require a physical exam of employees who are recalled after a layoff . . . and here's where an employer is apt to get in trouble.

The doctor for the Allegheny-Ludlum Steel plant of Watervliet, N. Y., turned down a recalled employee because of high blood pressure. Later on when his pressure came down, he was okayed for reemployment. But he claimed pay from the day of initial turndown to the day of rehire.

The doctor stated at the arbitration hearing that if the employee had been working at the time he wouldn't have recommended he be fired because of the high blood pressure. Picking this up, the arbitrator ruled that a recalled employee cannot be turned down for reemployment for any reason that



Conditioned air is supplied by central fan units. Sensitive Johnson Thermostats, regulating Johnson Valves on the heating and cooling coils and controlling the action of Damper Operators and Dampers, insure ideal temperatures throughout the building.

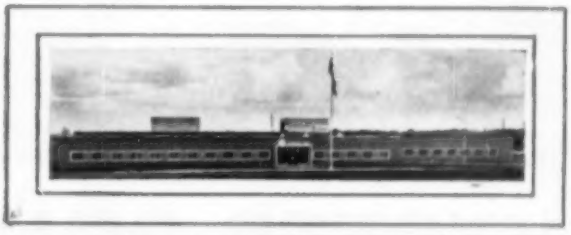
GENERAL TIME PLANT *gets Precision, Waste-Free Air Conditioning Performance with* JOHNSON CONTROL

Famous Westclox and Seth Thomas electric clocks are produced in the new million dollar, air conditioned plant of General Time Corporation. Among the many up-to-the-minute facilities designed to insure ideal working conditions and improve production efficiency in this progressive company's plant is a modern Johnson System of Automatic Temperature and Humidity Control.

Heating, cooling and humidity regulation problems include the control of five central fan air conditioning systems serving the manufacturing area, paint spray section, general offices and the lunch room. Each of the varied requirements of these five systems, and the working spaces served by each, is met with precision by properly applied Johnson Thermostats, Humidostats, Valves, Dampers and related control apparatus.

This system, *like every other Johnson System,* was especially engineered and installed to meet the exact needs of the building and its particular mechanical equipment. This, plus the superior control features of Johnson apparatus, makes it possible to accomplish the desired results without fuel waste and insures the maximum return from every dollar spent for heating and cooling.

Johnson Control combines the adaptability, accuracy and economy to solve correctly any problem of air conditioning, heating, cooling, ventilating, humidity or process control. Whether your problem involves comfort control or the provision of protective temperatures and humidities for products and processes, a nearby Johnson engineer has the answer. His advice is yours without obligation. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

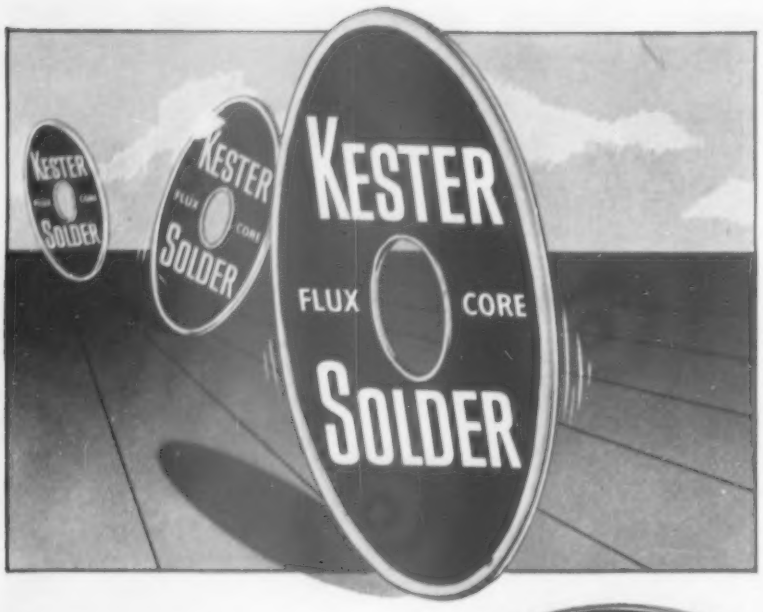


General Time Corporation, Athens, Georgia. Walter Kidde Constructors, Inc., architects, New York, N. Y., Bryant-Davis Electric Co., air conditioning contractor, Greenville, S. C.

JOHNSON CONTROL

TEMPERATURE AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885



KEEPS 'EM ROLLING!

It's good to know you can always depend upon Kester Flux-Core Solder to keep production rolling. That's because Kester makes solder quality a never-swerving habit, insisting on constant solder alloy control and consistent flux formulae. When you want dependable solder and soldering, Kester Solder is the right name to remember!

BE SURE YOU GET Kester's 78-Page Informative Textbook "SOLDER . . . Its Fundamentals and Usage."

KESTER SOLDER COMPANY 4213 Wrightwood Avenue, Chicago 39, Illinois
Newark 5, New Jersey • Brantford, Canada

Begins on page 208

would not cause his discharge were he at work. (This, of course, is in the absence of any contract provision on the subject). It's a good principle for employers to keep in mind.

Discrimination Out for Pa.

No more discrimination in Pennsylvania. At least, it's unlawful. It's the 11th state to adopt an anti-discrimination law of the "compulsory" type. Left in force are the various local FEP laws such as those passed by Pittsburgh and Philadelphia—but complainants have the choice of choosing the protection of either the state or local law.

A noteworthy feature of the Pennsylvania law: Discrimination based on age is outlawed. Age is 40 to 62 years. Massachusetts is the other state with an anti-age-discrimination feature.

Snub Job–No Unemployment Pay

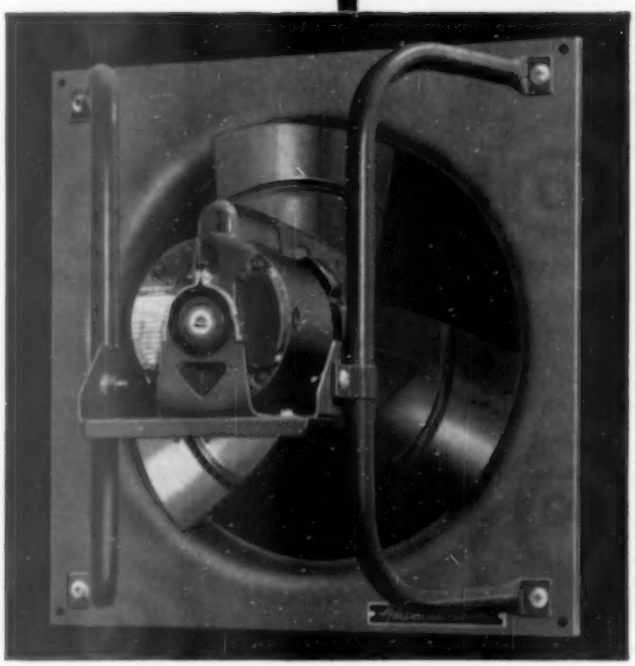
In Connecticut, an applicant cannot snub an offer of a job in a union shop and expect to get unemployment compensation benefits. The Superior Court of New Haven said that such an applicant had "failed without sufficient cause . . . to accept suitable work when offered him by the public employment bureau." His refusal was nothing but a personal idiosyncracy. It might be different, concedes the court, if Connecticut had a right-to-work law—but it didn't.

Special Training and Job Promotion

When Purolator Products, Inc. (Newark, N. J.), oil filter manufacturer, trained several employees in inspection procedures, it fully expected to be able to promote one of them to an inspection job—when

American Blower
Ventura Fans
offer you

top performance and economical ventilation



American Blower Model K Ventura Fan

You can count on American Blower Ventura Fans to do the job they are designed for, with high efficiency and a minimum of maintenance. They are built for long life and top performance. All ratings are certified.

American Blower Model K Ventura Fans are ruggedly constructed, heavy-duty propeller fans for tough industrial applications. They offer the power you need . . . when you need it, and will operate against static pressures up to 5/8". Request Bulletin 6514.

American Blower Ventura Fans are attractively designed, quality built, and easy to install . . . *yet competitively priced.* Ventura Fans come in a wide range of sizes and capacities — with constant-speed and two-speed direct drives, totally enclosed motors — to satisfy your exact requirements.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Centrifugal, Axial and Propeller Fans adopted jointly by the National Association of Fan Manufacturers, Inc. and the American Society of Heating and Ventilating Engineers.

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Certified Ratings

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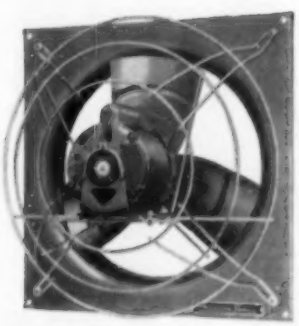

Model G Ventura Fans

Model G, at left, is a sturdily built and attractive fan suitable for light industrial duty and commercial applications. It is especially quiet-operating, making it ideal for offices, stores, and lobbies — or wherever quiet operation is required. Write for your copy of Bulletin 6414, which gives complete performance data.

American Blower products serve industry

Air Conditioning, Heating, Ventilating Equipment
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Centrifugal Compressors
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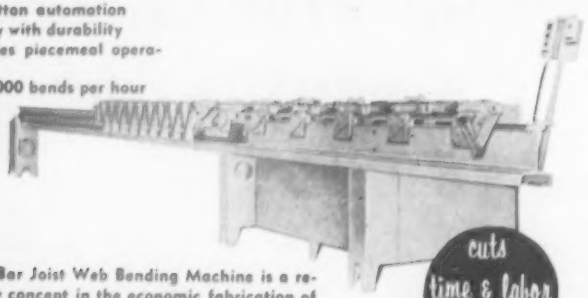
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American-Standard

AMERICAN 75th Anniversary 1881–1956 **BLOWER**

Announcing...

the new EIDAL BAR JOIST WEB BENDING MACHINE

- Push-button automation
- Economy with durability
- Eliminates piecemeal operations
- Max. 6,000 bends per hour



cuts time & labor costs

The Eidal Bar Joist Web Bending Machine is a revolutionary concept in the economic fabrication of bar joists. The entire center web section is automatically bent and released in a single cycle operation of less than a minute. Methods of cutting and bending short stock are eliminated. No die markings or cross section reductions are experienced in attaining the correct radii. Time and labor savings up to 50% have been reported. Available option: automatic loader.

WIRE OR WRITE FOR ILLUSTRATED BROCHURE WITH DATA ON PRICE, WEIGHT, AND PRINCIPLE FEATURES.

EIDAL manufacturing company

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CABLE CODE: EIDAL

YOU CAN MAKE

TRASH BURNING

A MODERN LOW COST OPERATION

A BRULé FG4-T UNIT IS YOUR PRACTICAL SOLUTION

All FG-4 units are PORTABLE

Available in 200, 300, and 500 pounds per hour capacity. Each weighs one-half that of a comparable masonry unit. Interior installations can be made from basement to roof.

● BRULé specialization has made possible design and operating features that save your dollars from going to waste. For example: Walls are air cooled. Preheats combustion air. Increases efficiency. Secondary air intake insures complete combustion. Keeps flue gases below 700. BRULé step and flat grates assure peak fire chamber temperatures. Stoking is eliminated. Feeding is made easy thru the charging door. No burning embers or hot ashes can fall out of the door.

Know all of the features of the BRULé trash burners. You'll find the BRULé way loaded with benefits. Use the coupon or write.

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In Canada:

150 Perth Ave., Toronto, Ont.

Brulé Incinerators, 407 S. Dearborn St., Chicago 5, Ill.

Please Send Bulletin 52B

Company .....

Your Name .....

Address .....

City ..... Zone ..... State .....

Begins on page 208

the opportunity came up—particularly since the union went along with the training idea. But the union kicked when one of the trainees was promoted—over a senior employee without training. The union contract called for promotion based upon seniority with "ability being a factor."

The arbitrator who reviewed this case sided with those arbitrators who feel that employers can't train juniors so as to promote them over seniors.

BRIEF BUT IMPORTANT

Time off for fire buffs. 4000 Remington Rand employees in Elmira, N. Y., will be paid for time lost when called out to fight fires as members of local volunteer fire departments.

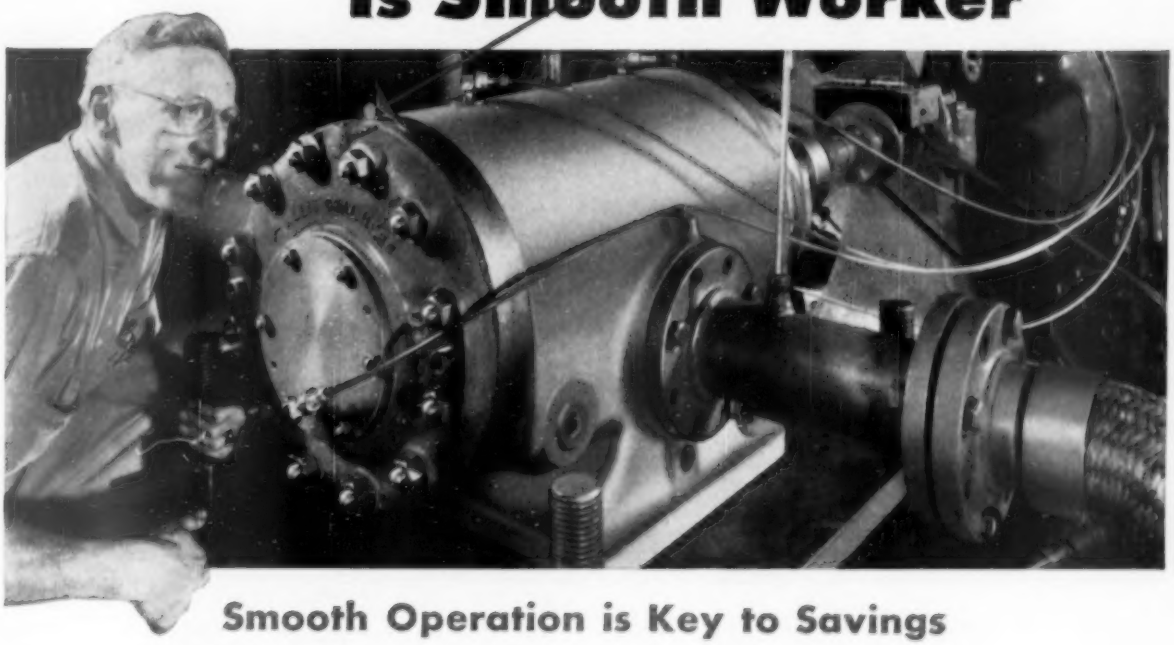
Putting pensions in contracts. The National Industrial Conference Board points out that there is no hard and fast rule about spelling out pension plans in the union contract. A survey of 234 companies shows that 44% spell them out in detail. In 54% the pension plan is a separate document with mention being made in the union contract.

AFL Machinists spreading out. A vigorous organization drive is slated for the automotive sales and service fields. *Labor Daily*, newspaper of the Typographical Union (AFL), reports that a $200,000 joint organizing fund has been put together by the AFL Teamsters and the AFL Machinists for the purpose of unionizing those fields.

Coming: Labor Union directory. The Bureau of Labor Statistics, Washington, D. C., is about to issue a "Directory of National and International Labor Unions in the United States" (Bulletin 1185).

Combined unemployment payments gaining. Thus far, Delaware, Michigan, Connecticut, Massachusetts, and New York have okayed concurrent payments of Unemployment Compensation and private SUP

Coin Trick Proves
RO-FLO COMPRESSOR
Is Smooth Worker



Smooth Operation is Key to Savings

Everybody around the place knew the *Ro-Flo* compressor was a smooth operator. But just how smooth?

Someone suggested the old coin trick . . . balance a coin on it while it's running.

The next we knew the foreman was calling, "Come down and see for yourself." We went to the shop. And sure enough, there the penny was standing as still as you please.

What does that mean to you?

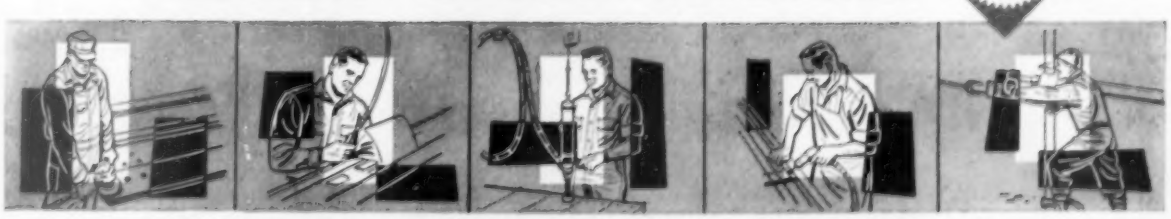
It means, here's a compressor that needs practically no foundation. And it means there's no wear and tear from vibration...less maintenance.

You get constant air supply with this machine, too. For this story: Call your nearby A-C office for complete information, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

A-4716

Ro-Flo is an Allis-Chalmers trademark.

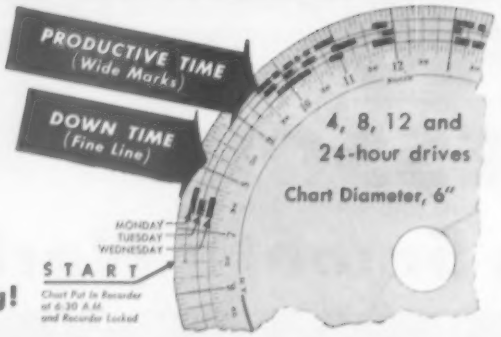
ALLIS-CHALMERS



Ro-Flo compressors provide constant efficiency and air supply for air tools

How To Check DOWN TIME!

NOW, a chart right in your office shows every time a machine STANDS IDLE ...and how long!



with NEW ELECTRICAL MODEL M
SERVIS RECORDER

Mount Model M Servis Recorders on the wall of your office or any other convenient place, then just connect them by wire to your machines.

Any industrial machine can *write its own* working-record on the Servis Recorder chart (sample portion above). You instantly see all stops and delays. So you can reduce avoidable down time, increase production, and thus repay the moderate cost of Servis Recorders *many times over* . . . Servis Recorders will also record the accuracy of industrial processing operations, such as paint baking, mixing, curing, etc. They show if the process is being done in exactly the right time. This prevents spoilage and insures better product quality. Servis Recorders are valuable in time studies also, to set rates. For the complete story—

WRITE for Industrial Catalog No. 10

FEATURES OF NEW MODEL M

Visible, electrical recording • Location anywhere, distant from machines • No ink, no pen to obscure chart • Far lower cost than comparable devices • Available with Elapsed Timer or Counter.

We also furnish mechanically operated SERVIS RECORDERS that clamp right on the machines. Just bolt them on to any moving part and they accurately record all stops and delays. Simple, inexpensive, easy—the motion of the machine "writes" its daily work-record.

THE SERVICE RECORDER CO.
1375C Euclid Ave., Cleveland 15, Ohio

Begins on page 208

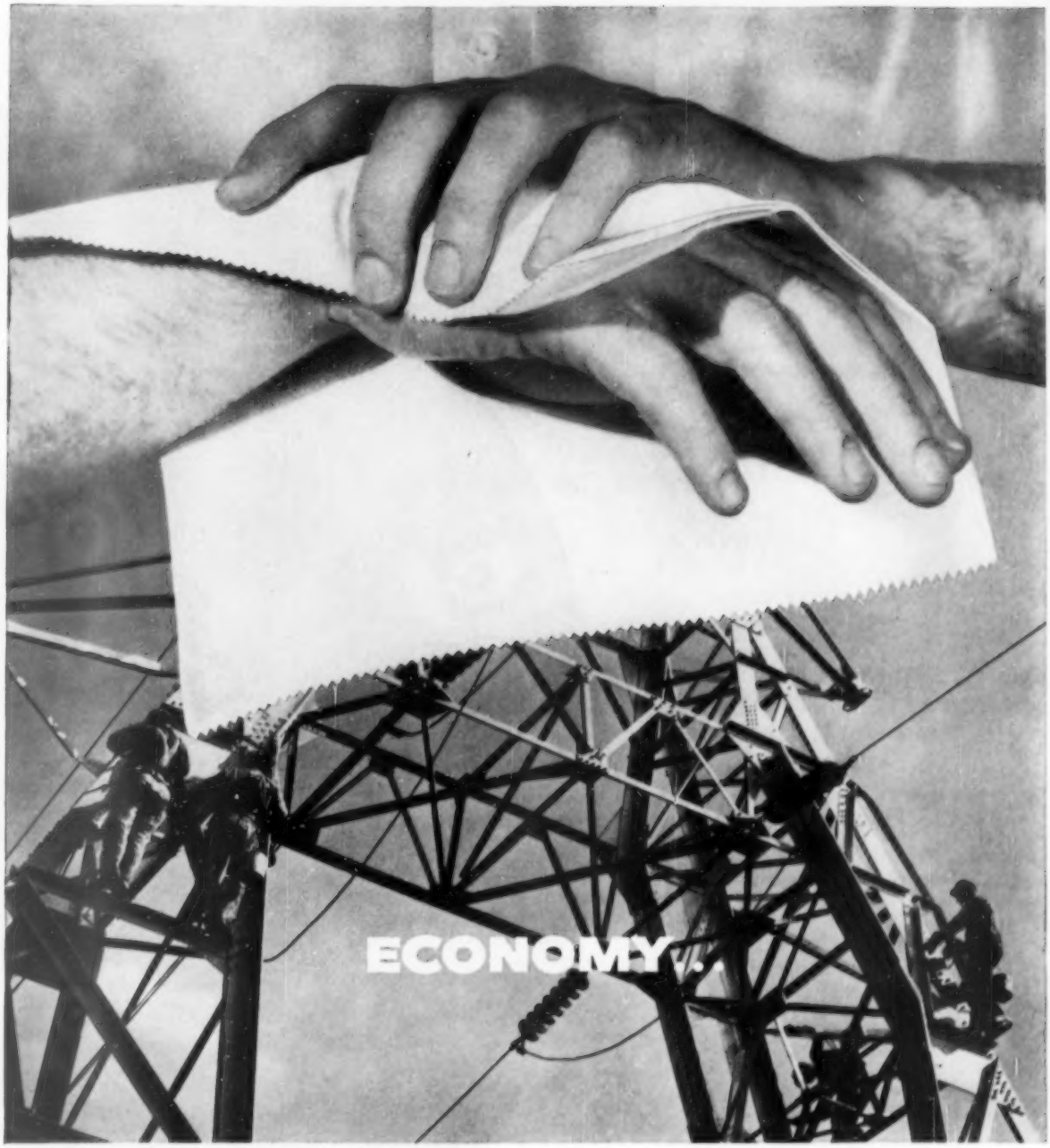
benefits. Total coverage is now near the 2/3 of all UAW-CIO workers needed to make binding the GAW clause in auto contracts signed last June. But recent turndown in Ohio has held off final certification of these payments.

Engineers' salaries surveyed. The American Management Association reports that engineers and other professional employees now earn 4.5% more than last year. Median pay for beginning engineers is $4500; industrial engineers, $6000; chemical engineers, $6500; mechanical engineers, $7000.

John L. puts bite on Mine Workers. Lewis may get more dollars for them . . . but he also asks for more. United Mine Workers will collect $20 special assessments from members between now and April 1 . . . to create a fund of some 4-million dollars to enable it to defend itself against those who are "seeking to destroy it through harassing legal actions and other devious means."

Test for communist law. Attorney General Herbert Brownell brings the first case against a union under the 1954 Communist Control Act. He's petitioned the Subversive Activities Control Board for a finding that the International Union of Mine, Mill and Smelting Workers (Ind.) is a Communist-infiltrated organization. If he gets what he wants, the union will be barred from using the NLRB and will lose other rights granted by the Labor-Management Relations Act.

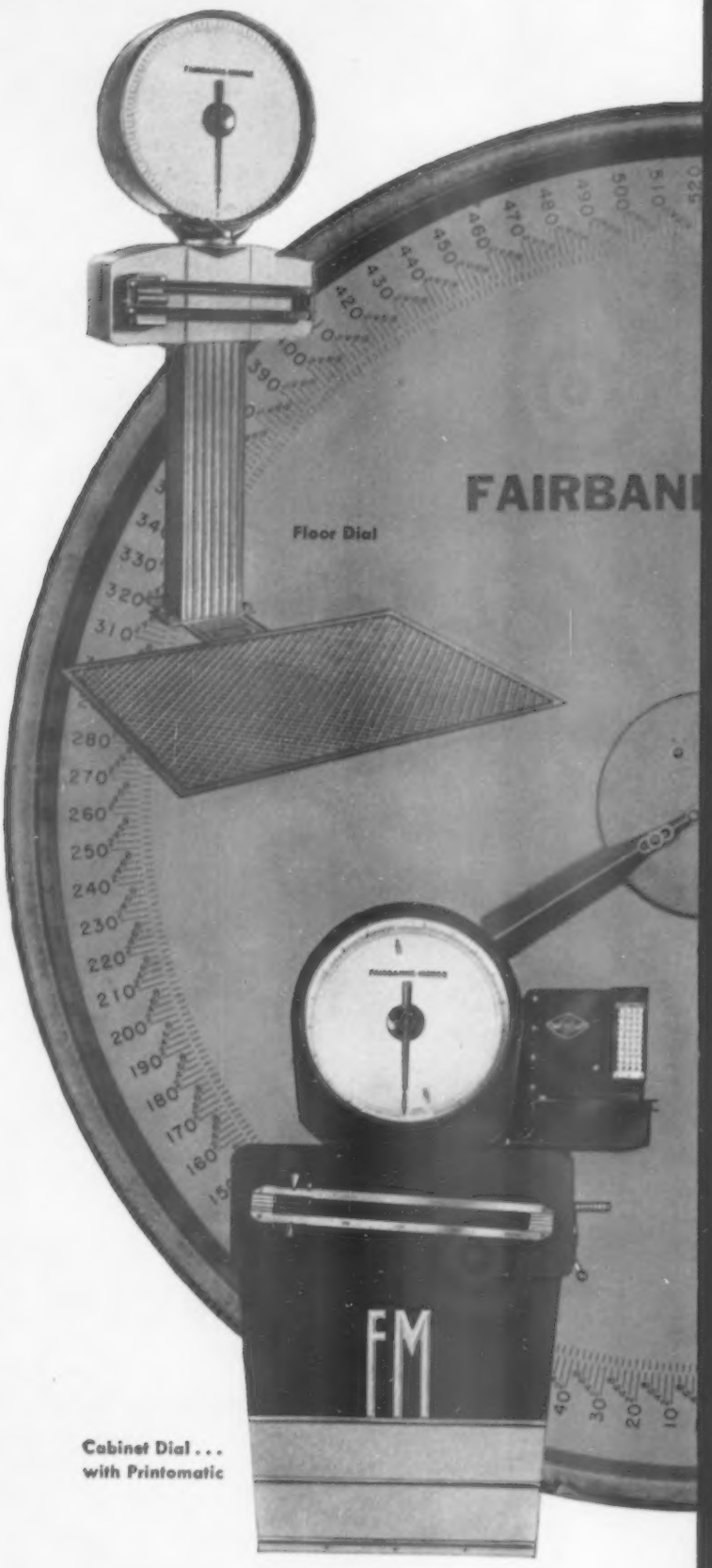
Stock as a recruitment bonus. Issuance of a corporation's stock in return for entering the corporation's employ violates Section 69 of New York's Stock Corporation Law, rules an appellate division court of that state. The employee in question had special knowledge and contacts that were of value to the corporation, but the court held that the directors committeed a wrong in giving him stock for going with the corporation. And that they must be held liable for the par value of the stock issued. *Brown v. Watson*



First with America's public utilities

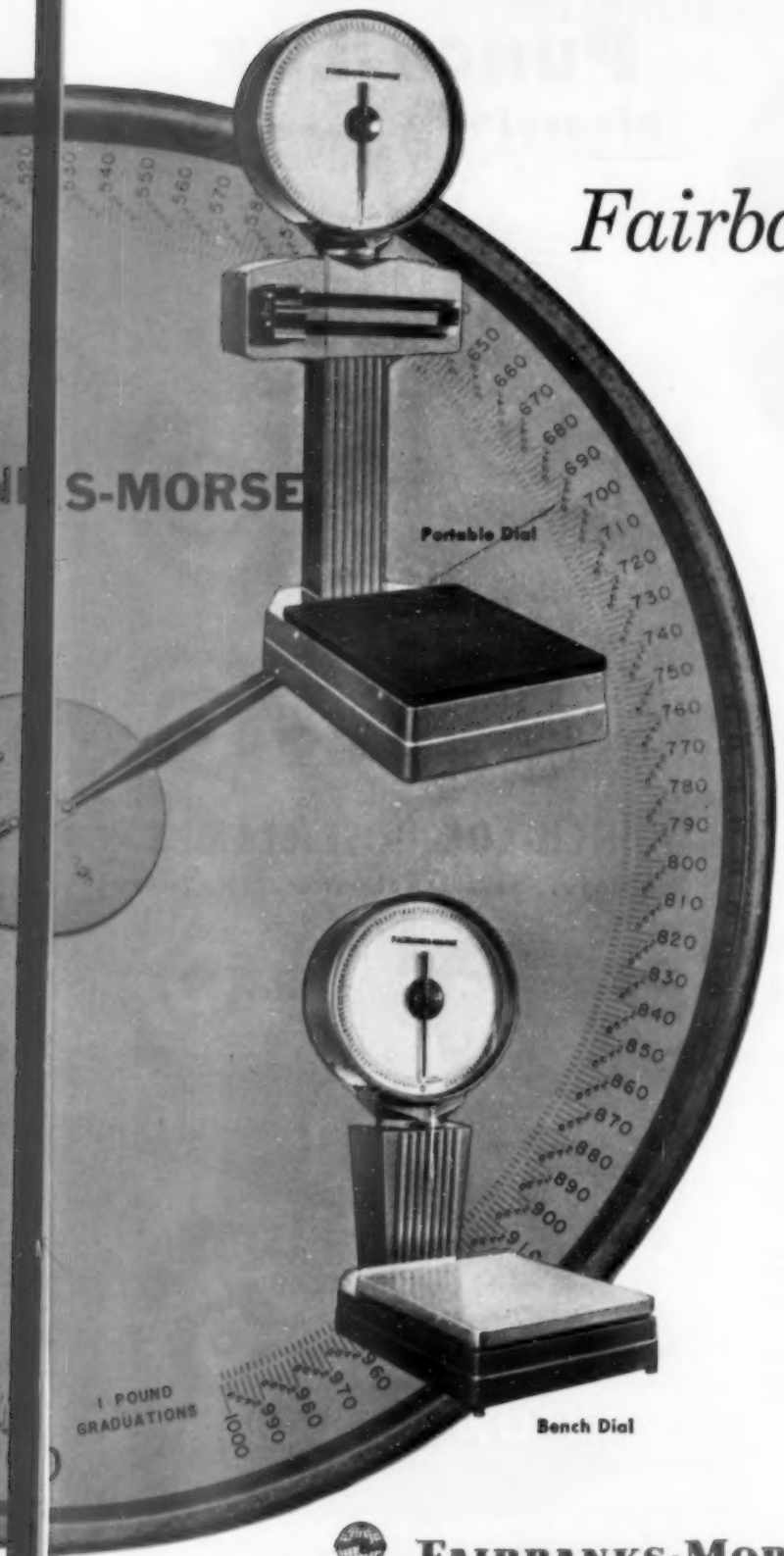
NIBROC® TOWELS ... first wet strength towel and still the finest ... More power and light companies use economical Nibroc Towels than any other paper towel. It's the same with most industries and institutions. That's because Nibroc Towels are super-absorbent—strong—sanitary—soft-textured! Buy the finest—Nibroc Towels and Nibroc Sofwite or Softan Tissues—from a single source. For name of distributor, see "Nibroc" in your classified directory or write Brown Company, Dept. NC-1, 150 Causeway Street, Boston 14, Mass.

announcing:



Floor Dial

**Cabinet Dial . . .
with Printomatic**



Fairbanks-Morse floaxial dial scales

EASY TO READ...

EASY TO USE...

LASTINGLY ACCURATE

Everything you've ever wanted in a dial scale, you'll find in the completely new . . . completely different Fairbanks-Morse line!

Fairbanks-Morse engineers designed the new line with your needs in mind . . . based on exhaustive field reports. They're streamlined . . . easy to read . . . easy to use . . . rugged to resist shock loads and rough handling . . . easy to service and maintain. And, above all, they have the new, patented *Floaxial* dial mechanism that assures enduring accuracy. There are no knife edges or pinpoint pivots to wear and affect long-life accurate weighing.

Dial chart and indicator are designed for easiest reading—ever! There's nothing to distract the eye . . . you get faster, easier weight indication . . . less chance for reading errors. Dial head swivels a full 360 degrees for easy reading at any angle!

For the complete, time-saving, cost-saving story on the new Fairbanks-Morse Dial line, see your Fairbanks-Morse Weighing Expert or write direct, on your letterhead, for new, colorful, descriptive bulletin on the type of Floaxial dial you want. Address Fairbanks, Morse & Co., Dept. F-1, 600 S. Michigan Ave., Chicago 5, Ill.

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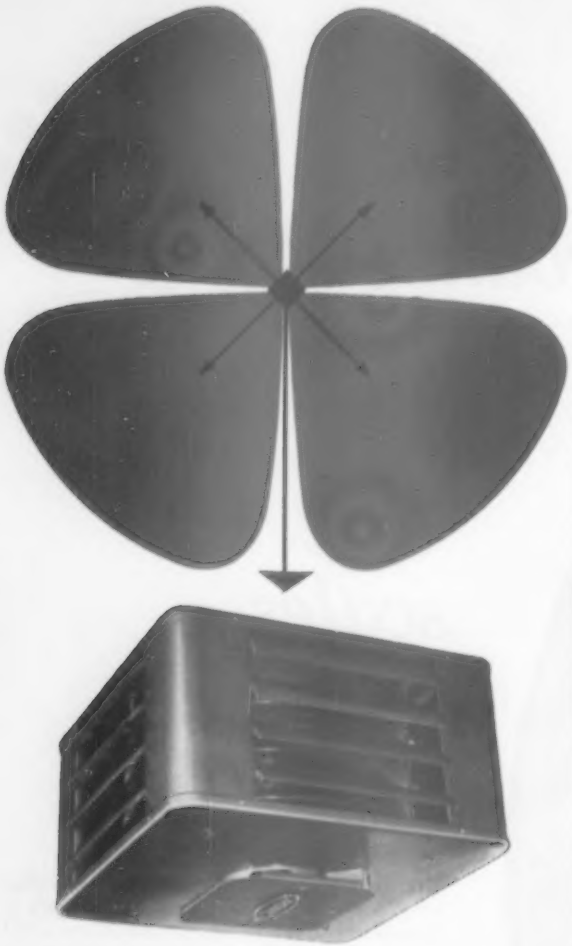

"Clover leaf" air distribution covers 1/5 acre with heat

For heating coverage, you can't beat Carrier's exclusive "clover leaf" pattern of air distribution.

Just one of the new 4-way Carrier Unit Heaters will spread hot air over 8500 square feet of floor space. Better than 3 conventional fixed outlets, projection-type unit heaters.

Simple adjustments vary the pattern. No outlet to change. No accessories to add.

Eight sizes for steam or hot water with ratings from 55,000 to 600,000 Btu/hr. Look in the Classified Telephone Directory for the name of your local jobber-distributor.

Carrier Knows Heating! Over fifty years of leadership in air conditioning have given Carrier unmatched experience in temperature control—heating and cooling! Carrier Corporation, Syracuse, New York.

Carrier

air conditioning • refrigeration
industrial heating

Scalpel? Hammer? Chisel?

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Please!

PUNCH-LOK HOSE CLAMPS

No Snag . . . No Leak . . . No Wear . . . No Tear

"The Sign of a GOOD Hose Clamp"

Dr. Punch says,
"When Mr. Lok locks
'em they stay locked!"

See your nearby Punch-Lok Distributor—or write today for product and price information.

PUNCH-LOK *Company*

5494

Dept. D, 321 North Justine Street, Chicago 7, Illinois

HOW TO USE HALLOWELL ADJUSTABLE SHELVING

SELECT THE BASIC SHELVING UNIT,

USE IT INDIVIDUALLY
OR IN COMBINATION

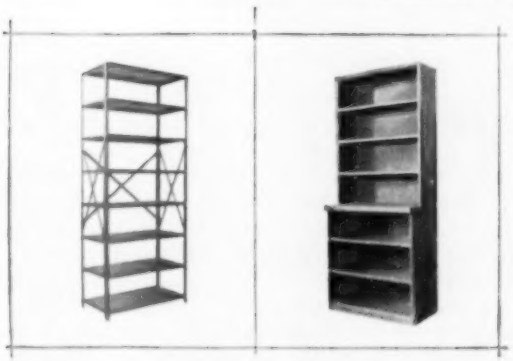
CLIP IN DIVIDERS

PUT IN SHELF BOXES

ADD SLOPING SHELF UNITS

AND
BIN FRONTS
AS NEEDED

ATTACH SWINGING
OR SLIDING DOORS



Baked-on Enamel Finish · Sturdy Steel Construction · Interchangeable Parts Easy to Assemble · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2057 · Hallowell Shop Equipment Division · Standard Pressed Steel Co., Jenkintown 11, Pa.

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BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

"Complete Control" solves another coffee-break problem!

DEE-LISHUS KWIK-KAFE' COFFEE IS SARVED PROMPTLY, FUM TH' RUDD-MELIKIAN COFFEE DISPENSER!!—IT'S ALLUS GOOD, AN' ALLUS READY!!
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In office or plant, wherever the coffee-break is a problem, Kwik-Kafé's "complete control" provides a tailor-made solution: delicious 100% pure Kwik-Kafé coffee, conveniently served on the spot from a dependable Rudd-Melikian dispensing unit; also hot chocolate and a variety of other beverages. Employees enjoy Kwik-Kafé. It keeps them on the job.

RUDD-MELIKIAN, INC.
Hatboro, Pa.

Kwik Kafe

Please send me a copy of booklet 13A explaining how to control the coffee-break with R-M dispensers.

Name .....
Firm .....
Street .....
City ..... Zone ..... State .....

By REX H. WILSON, M.D., Medical Director
The B. F. Goodrich Company, Akron

Handling Epileptics in Industry

It's a tough problem. When you try to do right by the epileptic, you may find yourself in trouble.

SHOULD YOU hire an epileptic? That's a tough question. Especially when I know of one company that has had three cases involving epileptic employees go to arbitration. Not to mention the numerous compensation difficulties encountered.

Know their limitations—The epileptic is to be pitied because his convulsive seizures may occur at any time. He always is a potential hazard. Industry is often afraid to hire him because he may injure himself during a seizure. Not only is he a compensation liability, but he's also somewhat of a misfit to have around a plant. His fellow workmen tend to shun him either because they are afraid to work with him, or because they do not like to see people having a "fit."

As a rule, the epileptic is emotionally unstable, economically insecure. He suffers from frequent frustrations because of his difficulty in finding and keeping a job.

In many states the epileptic cannot secure a driver's license. In 17 states the epileptic cannot marry another epileptic. *He should not drive a car, work about heavy machinery or on scaffolds or heights.* He should avoid deep water when swimming. He should not drink alcoholic beverages. He should avoid excesses and lead a planned existence with emphasis on regular meals and adequate rest.

Know your responsibility—If an epileptic has a seizure at work and injures himself, the employer is responsible. The epileptic cannot sign a waiver. During the seizure he may, because of his uncontrolled movements, also do harm to others.

Epilepsy is not new—Hippocrates wrote about it. Pre-historic man bored holes in his skull to let the

FORD MOTOR COMPANY OF CANADA, LTD.
NEW PLANT AT OAKVILLE, ONTARIO.

Architects:
GIFFELS & VALLET, Windsor, Ontario.

Contractors:
ANGLIN & NORCROSS ONTARIO, LTD.,
Toronto, Ontario.

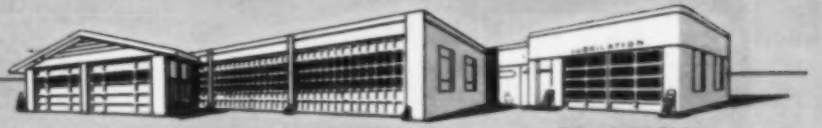
CRAWFORD MARVEL-LIFT DOORS
Built and Installed by
CRAWFORD DOOR SALES COMPANY
OF CANADA, LTD.,
DIV. F. FENTIMAN & SONS,
Ottawa, Ontario.

Canada's Largest Under-One-Roof (32½ Acres) Auto Plant is Equipped with CRAWFORD MARVEL-LIFT DOORS and OPERATORS

"Ford-Oakville" is one of the largest buildings in the world. It is designed for the assembly of Ford, Meteor, Mercury and Monarch cars and Ford and Mercury Trucks. No manufacturing is done here; parts are fabricated elsewhere and assembled here.

The plant is 1,760 feet long; 800 feet wide, with 1,250,000 square feet of working area. Building and installations cost $40,000,000. First steel girders were erected May 2, 1952 and the first car rolled from the assembly lines one year and nine days later. Landscaping includes trees, shrubs, flower-beds and more than 100 acres of lawns.

Installation includes 45 Crawford Marvel-Lift Doors, 43 of which are power-operated, with remote controls. If you have door questions, please write us. Your inquiry will get prompt, intelligent attention.



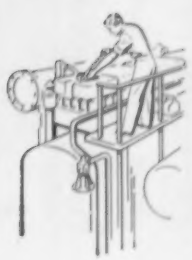
RESIDENTIAL INDUSTRIAL COMMERCIAL

Crawford Door Company, 164-20263 Hoover Road, Detroit 5, Michigan
Plants in 10 cities; Warehouses in 94 cities; Sales and Service everywhere.

SEE OUR CATALOG IN SWEET'S

Crawford MARVEL-LIFT Doors

WHAT'S WHAT in multiple air compressors



These 15 h.p. Binks air compressors, equipped with an after-cooler, deliver 110 cfm. May be operated together, or independently.

You save more...when you use multiple air compressors

Here is how you actually save time and money when you install two or more medium size Binks air compressors instead of one large unit:

More dependable: With two or more compressors, you always have one or more you can rely on should one require servicing. You will always have air for important work.

More adaptable: You can place these modern compressors anywhere in your plant...as a battery or individually. Additional units can be added quickly should additional air be required.

More versatile: When air requirements are small, you operate fewer units at a considerable saving.

More economical: A multiple installation of Binks air compressors costs no more than a large single air compressor delivering the same volume, when you take into consideration the cost of foundations and installation.

Easier maintenance: Each unit can be shut down for regular servicing without shutting off the air supply or working overtime.

To be sure you buy the right compressor read these two informative, illustrated booklets first. HOW TO SELECT AN AIR COMPRESSOR is packed with information you need to know, no matter what kind of compressor you buy. Binks CATALOG 810 illustrates and describes the many models available and gives the advantages of each. Ask your distributor for free copies; or write direct to:

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EVERYTHING FOR SPRAY PAINTING

GUNS

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FREE INSTRUCTION

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3114-34 West Carroll Ave., Chicago 12, Illinois

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Begins on page 222

devils out. Napoleon, Alexander, and Byron are said to have had epileptic seizures. It is estimated that there are 750,000 epileptics in the United States today.

There are several types of epilepsy: *Grand mal*—in which there is loss of consciousness, shaking of the extremities, and loss of bowel and bladder control; *Jacksonian*—which has a slow onset, only one side of the body involved, there is no loss of consciousness, but the condition may progress to generalized convulsions; *Petit mal*—in which there is a cessation of activity, the patient stares into space and seems to lose contact with the world about him momentarily; *Psychomotor*—in which there are only attacks of stomach upset, headaches, and other nervous disorders.

Epilepsy may be due to injury, malformations, or inflammation of the brain. The cause may not be known, or, it may be due to a blood vessel disorder or brain tumor.

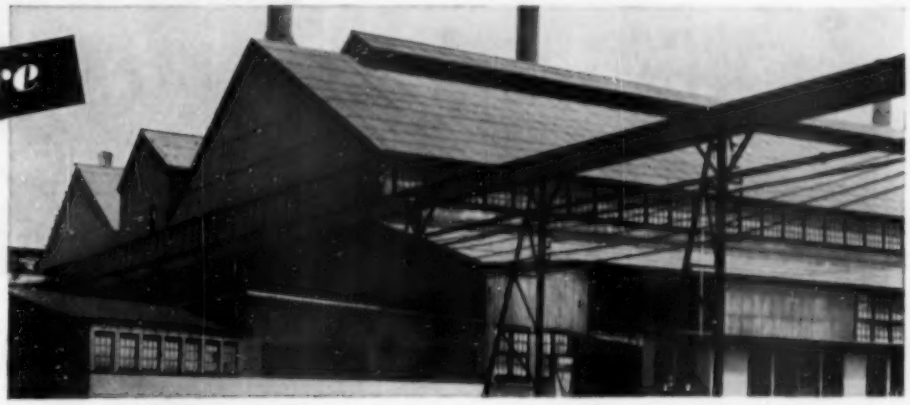
When an injury to the head and brain results in epilepsy, the first convulsive seizure usually occurs within three months. However, it may occur years later. Fortunately (from an industrial point of view) epilepsy due to trauma is usually easier to recognize and control than other types. It does, of course, present a compensation difficulty.

What you can do—The epileptic needs sympathetic understanding from everyone. He and his family must be told of the nature of his ailment and its limitations. His only hope of making a living is to take the proper medicine continuously to prevent a seizure. There are several good anti-convulsant drugs. No one single drug is best for all types.

The goal of the epileptic's physician should be to restore him to society—socially and economically, as well as medically. Most industries can aid this rehabilitation—if aware of his condition. (Unfortunately, this is up to the epileptic himself, since a routine pre-employment physical won't reveal it.) Actually, most epileptics are capable of pursuing a full life and even superior callings. With the right job and proper supervision, they can be valuable employees.

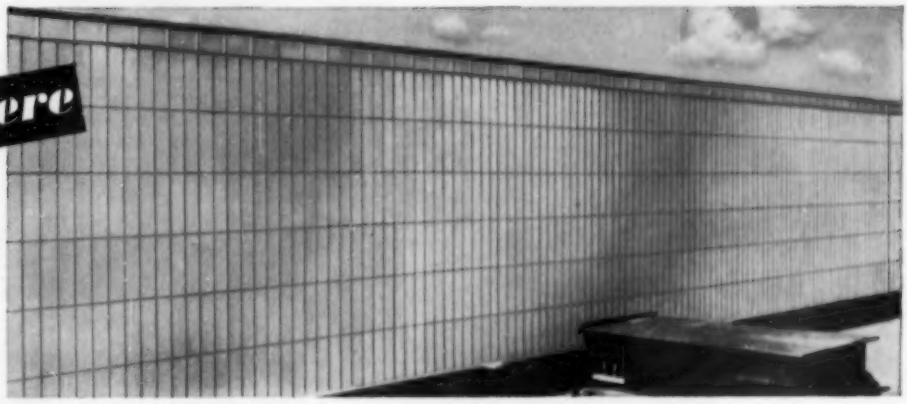
No costly maintenance problem

...here



On this steel plant, roofs and sidewalls of Johns-Manville Corrugated Transite withstand corrosive fumes . . . will never corrode or rot.

...or here



On this aircraft plant, stonelike Corrugated Transite sidewalls offer years of service without paint or special treatment to preserve them.

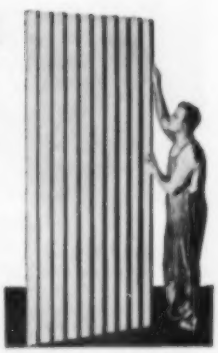
build with Johns-Manville Corrugated Asbestos Transite

For maintenance-free roofs and sidewalls plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof, rotproof and weatherproof. Corrugated Transite is also used increasingly for interiors. The streamlined corrugations and attractive shadow lines offer interesting design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure. Write Johns-Manville, Box 158, Department FM, New York 16, New York. In Canada write 565 Lakeshore Road East, Port Credit, Ontario.



- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

See "MEET THE PRESS" on NBC-TV, sponsored on alternate Sundays by Johns-Manville

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Johns-Manville

Right across the U.S. it's

BORROUGHS UNITIZED STEEL SHELVING

Industry is fast discovering that Borroughs Unitized flexi Steel Shelving is today's best buy! No shelving is easier to assemble and install. "Each individual unit is complete in itself . . any unit or shelf can be moved independently. No bolts or nuts are needed to assemble shelves. Investigate Borroughs Shelving before you buy!

Doors and closed shelving efficiently combined in this Borroughs installation in the mimeograph supply room of the State of California Personnel Board of Sacramento.

Another installation of Borroughs Industrial Shelving being used at the General Electric Construction Materials Division Warehouse in Chicago, Illinois.

Portion of the Borroughs shelving installation at the warehouse-carpet section of the J. L. Hudson Co. department store, Detroit, Michigan. Open end assembly permits easy storage of rolled stock.

Borroughs double faced open shelving installation at Charles Scribner's Sons, Publishers, New York City. Note compact shelving arrangement—open face unit at ends requires minimum floor space.

send for new 32-page catalog

BORROUGHS MANUFACTURING COMPANY

A Subsidiary of The American Metal Products Company of Detroit

3020 NORTH BURDICK amp KALAMAZOO, MICHIGAN

THERE'S A Randall PILLOW BLOCK AND BALL ASSEMBLY FOR EVERY TYPE APPLICATION

The unique Randall ball assembly is in its several different styles, a basic part of every Randall Pillow Block. It features the exclusive Randall "deep well" reservoir with controlled double lubricated graphited bushing. It is readily adapted to a variety of different housings and may be purchased separately.

NORMAL DUTY PILLOW BLOCK. A general service pillow block for normal duty on small shafts and for heavier duty on larger shaft sizes. Double lubricated with graphited, phospor bronze bushing in wool packed oil reservoir housing. For shafts $\frac{1}{2}$" to $3\frac{15}{16}$" inclusive.

FLANGE OR SIDE MOUNT PILLOW BLOCK. A Top quality pillow block for the most exacting service. Double lubricated with graphited phospor bronze bushing in wool packed oil reservoir housing. Widely used in air moving equipment, conveyors, and agricultural equipment. Side mounting only. For shafts $\frac{1}{2}$" to $3\frac{15}{16}$" inclusive. Other light and normal duty flange units available in three and four bolt styles.

SINTERED BUSHING SERIES. Sintered bronze bushings in streamline one-piece steel housings. Wool packed oil reservoir. Mounts in any position. Excellent for general service on smaller shafts $\frac{1}{2}$", $\frac{5}{8}$", $\frac{3}{4}$", $\frac{15}{16}$", and 1".

Ask your area distributor for more complete information and prices on Randall Pillow Blocks. The most complete line available anywhere.

BRONZE BAR STOCK
BRONZE BUSHINGS
PILLOW BLOCKS
SHEET LUBRICATOR

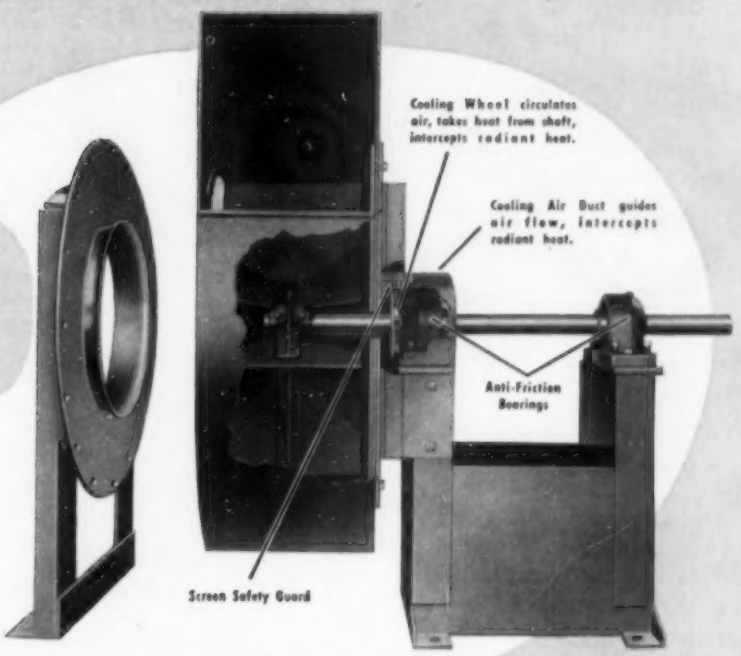
Randall

GRAPHITED BEARINGS
THRUST WASHERS
SAFETY COLLARS
BRONZE CASTING

RANDALL GRAPHITE BEARINGS, INC.

1003 SOUTH GREENLAWN AVENUE, LIMA, OHIO

WANT TROUBLE-FREE
high temperature air handling?


Cooling Wheel circulates air, takes heat from shaft, intercepts radiant heat.
Cooling Air Duct guides air flow, intercepts radiant heat.
Anti-Friction Bearings
Screen Safety Guard

New Clarage Type XL Fan shown in "opened up" view is typical of the sizes which provide universal discharge.

MONEY-SAVING SOLUTION:

Clarage's new Type XL Fans equipped with AIR Cooled Bearings!

FOR TEMPERATURES UP TO 750° F., here's a simple, dependable, inexpensive feature available on standard Clarage fans. Costlier water cooled bearings NOT required. By all means, on your next "hot" job consult the Clarage sales engineer about this money-saving optional feature.

The new Clarage Type XL Fan — with its advanced design — offers many other important advantages in industrial air and material handling.

Learn about the high efficiency, rugged construction, and in-the-field adaptability of this exceptional fan equipment by requesting Bulletin 702. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

NOTE: For heavier-duty service or temperatures above 750° F., this and other types of Clarage fans can be provided with water cooled bearings.

You can Rely on...

CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canady Fans, Ltd., 4285 Richelieu St., Montreal

A new 'Mighty Midget'® rounds out famous line

No. 236 — ¼" chuck — 1500 rpm

Every *Mighty Midget* is a power packed, heavy duty drill. The new No. 236 completes the line. Now you can get a ¼" chuck *Mighty Midget* with no load chuck speeds from 5,000 to 1,500 rpm, and ⅜" chuck model rated at 1,000 or 600 rpm.

Check these drills against your needs.

Drill No.	Chuck Size	Capacity	No Load Chuck Speed	Length Overall
232	¼"	¼" in steel ½" in hard wood	5000	8⅛"
233			3500	
234			2500	
235			2000	
236			1500	
237	⅜"	⅜" in steel 1" in hard wood	1000	8½"
238			600	

Every *Mighty Midget* has anti-friction bearings, trigger switch with locking device and aluminum die-cast housing with high polish Stanley finish. Your industrial distributor is now able to demonstrate the whole line. Call him or write Stanley Electric Tools, 341 Myrtle St., New Britain, Conn., for further details.

STANLEY

The Stanley Works • New Britain, Conn.

ELECTRIC TOOLS • TOOLS • HARDWARE • STEEL • STEEL STRAPPING

Begins on page 138

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

31—Fiberglas Metal Building Insulation. Product data bulletin illustrates an 8-step method of installation by the Metltab System. Points out five advantages of the system. Close-ups of Metltabs and the insulation; a ceiling application. *Owens-Corning Fiberglas Corp.*

32—Lift-Pull Hoist. Here's the story on "Tugit," a lever-operated portable tool that is built like a hoist, but lifts and pulls. Bulletin 388-E cites seven advantages. Lists specifications and dimensions. 8 photos of "Tugit" at work. *Manning, Maxwell & Moore, Inc.*

33—Air Conditioning and Refrigeration Equipment. Packet of literature contains catalogs on "Spotaires," air conditioning units, air conditioning coils, evaporative condensers, product coolers, and water chillers. Installation manuals included. *Drayer-Hanson, Inc.*

34—Dust Filter. Bulletin 559 covers the design, application, and benefits of the "AC" reverse jet filter. Well illustrated with many photos, schematic and simple drawings and cutaway view. Useful engineering tables. Includes dust problem analysis sheet. *Day Co.*

35—Magnetic Separators. How an electric company saved $2300 in one year after installing magnetic separators is described in Bulletin 601. Cites reduction in coolant consumption, elimination of more than 900 maintenance man-hours. *Houdaille-Hersey of Indiana, Inc.*

CORROSION CONTROL

36—Cathodic Protection. How to "fight corrosion with corrosion" in any corrosion problem resulting from contact between metal and water or soil is discussed in this 12-page booklet. Design and application of a system is covered. Well illustrated. Form TP-103. *Electro Rust-Proofing Corp.*

Turn the page

A
B
C
D
E
PROPER COOLANT FILTRATION CAN:
A Eliminate frequent throwaways, reducing amount of coolant used by as much as 50%.
B Cut number of wheel dressings in half, increasing wheel life.
C Completely eliminate hundreds of man-hours per annum on sump cleaning and sump pump maintenance.
D Boost efficiency of grinder, increasing machine output.
E Definitely raise quality of work, holding closer tolerances, with resultant savings through fewer rejects.
A filter's got to be good—and right to save money

PROPER FILTRATION

can save you thousands in maintenance and materials

For fuel, hydraulics, lube . . . any fluid – in thousands of applications in industry . . . filters that are properly selected and installed pay for themselves in a surprisingly short time. They render a substantial saving month after month from then on. You want facts, not adjectives? Take a look at the information on grinder coolant filtration in our illustration.

Naturally you'll insist on a quality filter. That goes without saying if you specify Purolator. But using the correct filter for your application can make a surprising difference in money saving results, too.

The Purolator line has been developed on a broader scale than any other filter line for just that reason. Purolator gives you a wider selection of standard units so your exact requirements can be met economically. And you get the valuable technical assistance of America's oldest and most experienced filter manufacturer to guide you in selecting the best unit for you.

This combination of engineering and manufacturing experience can add up to substantial savings. Send for Purolator's General Industrial Catalog, or better yet, ask us specific questions about possible filter applications in your plant. No obligation, of course. Address Dept. P1-15, Purolator Products, Inc., Rahway, N. J.

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FACTORY / CATALOG NEWS

Begins on page 138

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

37—Plastic Lining and Coatings. Three bulletins are offered: One on a lining for protection of pipe, tubing, valves, etc. Another on custom coating for protecting specialty items. A third on a coating for tubular goods. Applications and case histories. *Tube-Kote, Inc.*

38—Fabricated Alloys. 32-page Catalog G-10 presents more than 200 heat- and corrosion-resistant products—furnace muffles, furnace trays and fixtures, retorts and pit-type furnace equipment, salt bath equipment, processing and pickling equipment; many more. *Rolock Inc.*

39—Plastic Coating. Data Sheet No. 75 describes in detail a seamless, non-porous, non-aging, tough, abrasion-proof coating, highly resistant to chemical action. Lists chemicals against which it's particularly effective, and physical properties. *Quelcor, Inc.*

40—Cathodic Protection Systems. Technical brochure discusses principles of system for halting existent corrosive action, for keeping new installations free of significant corrosion damage in deep well pumps, storage tanks, etc. Case histories. 12 pages. *Harco Corp.*

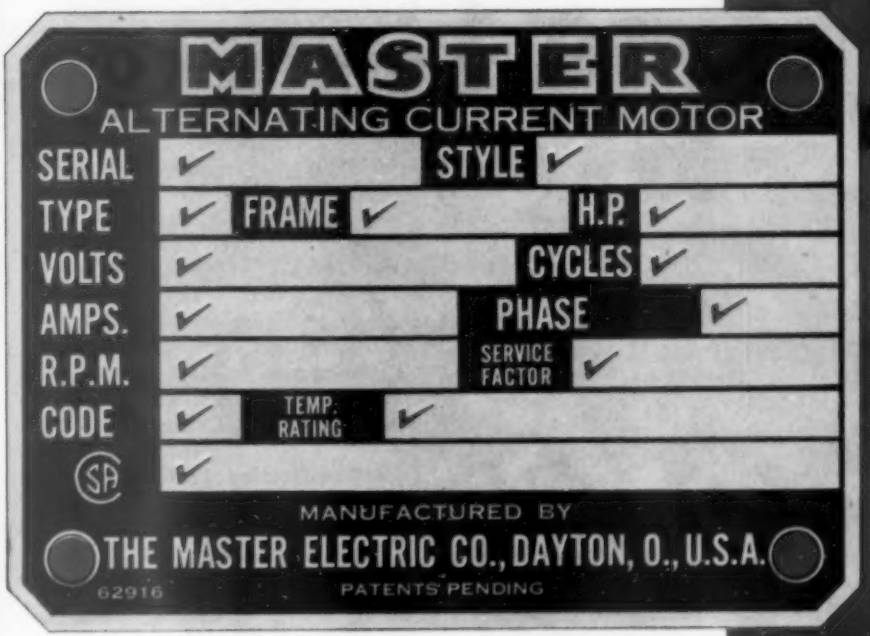
41—Coating Oil. Subject of Technical Bulletin No. 2 is a premium-grade metal-coating oil for protecting hot- or cold-rolled sheet and strip steel against rust while in process, storage, or shipment. Illustrations show how it works, how to apply it. *Sun Oil Co.*

PRODUCTION

42—Grinding Wheels. "How to Select Grinding Wheels for Precision Grinding, Tool and Construction Steels" is the title of this 22-page, pocket-size booklet. Consists of reprints of three articles that appeared in Norton's monthly magazine on better grinding, entitled "Grits and Grinds." *Norton Co.*

Turn the page

Write your own ticket—

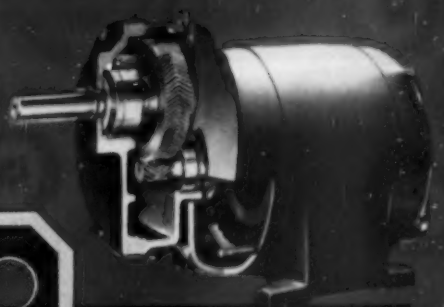


What are your power drive requirements? Here at Master, with the widest selection in the nation to choose from, you're sure to fill your needs quickest and best.

Need something special in gear reduction—electric brakes—variable speed operation—fluid drive or special mounting? Or would some of our standard models (⅛ to 400 H.P.) fill the bill? You'll find the answer here! And remember, all Master components are engineered to form combinations of units in one streamlined, compact package of efficiency. Name your need and the name that fills it is Master—for greater salability of motor driven products; for increased productivity of plant equipment.

Motor Ratings	⅛ to 400 H.P. All phases, voltages and frequencies.
Motor Types	Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.
Construction	Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.
Speeds	Single speed, multi-speed, and variable speed.
Installation	Horizontal or vertical, with or without flanges and other features.
Power Drive Features	Electric brakes (2 types)— 5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically-controlled variable speed units—fluid drives—every type of mounting.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

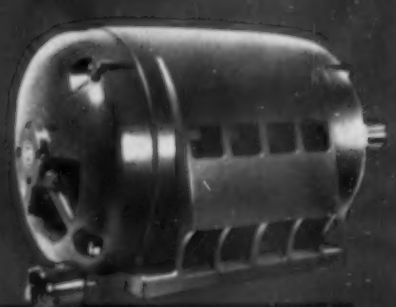


Parallel Shaft Gearmotors

Right-Angle Shaft Gearmotors

Unibrake Motors

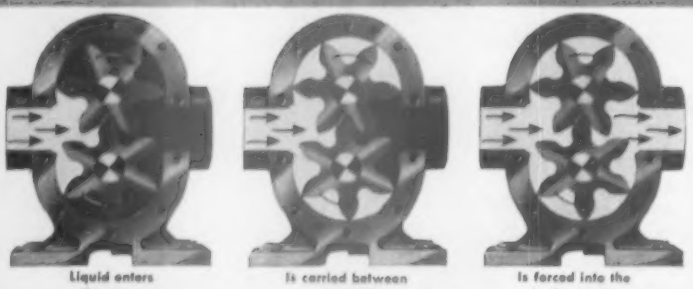
Speedrangers



Standard Motors—⅛ to 400 H.P.

IF
"THE PRINCIPLE OF THE THING"
MEANS ANYTHING TO YOU
then look to ROPER

only 2 moving parts
HELP MAKE ROPERS DEPENDABLE



SMOOTH AND QUIET FLOW...
EQUAL EFFICIENCY IN EITHER DIRECTION

HOW IT OPERATES — The unmeshing of the gears produces a vacuum, drawing the liquid into the tooth spaces. The liquid is carried between the teeth and case to the opposite side of the pump. The meshing of the gears forces the liquid into the discharge line. This is a positive displacement pump. The Roper principle is simple in design. It has only two moving parts — equal size pumping gears — operating in a case with proper amount of clearance to promote high efficiency and long life.

GEO. D. ROPER CORPORATION 181 Blackhawk Park Ave., Rockford, Ill.

Send for helpful handbook
"HOW TO SOLVE PUMPING PROBLEMS"

ROPER
Rotary Pumps

Begins on page 138

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

43—Power Tools. 51-page Catalog 55 presents tools for cutting, shaping, drilling, and finishing wood, metal, fiber, and plastics. Describes and illustrates jointers, planers, band saws, drill presses, lathes, belt sanders, tilt arbor saws; many more. *Boice-Crane Co.*

44—Stainless Steel Fabrication. Spiral-bound "Fabricator's Handbook" contains a wealth of information on forming, machining, cutting, joining, heat treating and picking, finishing—a thumb-indexed section on each subject. 162 pages. *Crucible Steel Co. of America.*

45—Work-Holding Tools. Catalog 9155 contains detailed information on vises for angle machining, adjustable lathe fixtures, safety work holders for drill presses, many other special and standard work-holding devices for metal working. 12 pages. *Universal Vise and Tool Co.*

46—High Vacuum Furnaces. Equipment for melting, heat treating, sintering, annealing, brazing, degassing, and purification of metals and alloys is described and illustrated in Catalog 552. Features of the processes are explained. 8 pages. *High Vacuum Equipment Corp.*

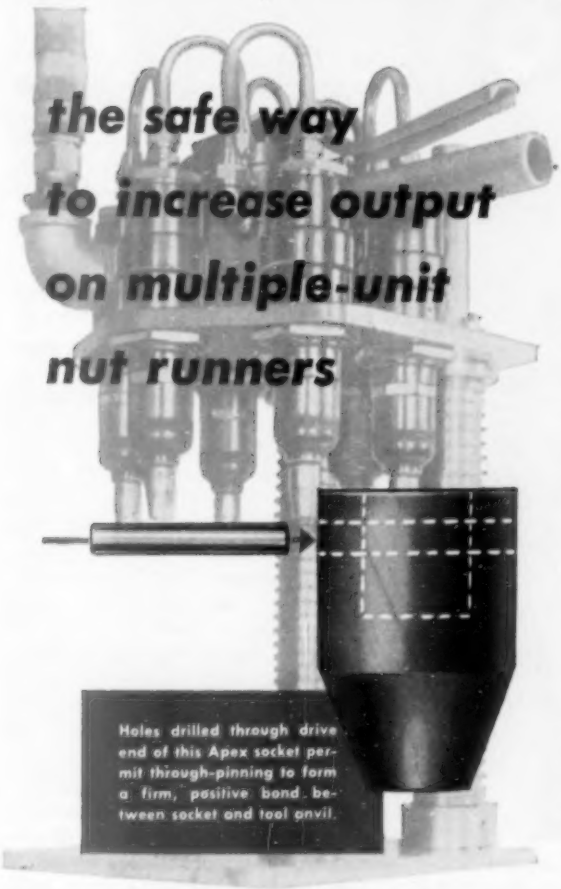
ELECTRICAL

47—Switchboards. Building block concept is described in four-color, 40-page bulletin, "Switchboards with Basic Circuits." Shows how eight classifications of standard switchboards are constructed, operated, tested. Specifications for duplex switchboards are included. GEA-4127B. *General Electric Co.*

48—Machine Tool Motors and Drives. Comprehensive descriptions and clear, large-size photos provide essential data on more than 15 motors and drives. Supported by illustrations on installations; technical data on electrical features. Bulletin 1750. *Louis Allis Co.*

Turn the page

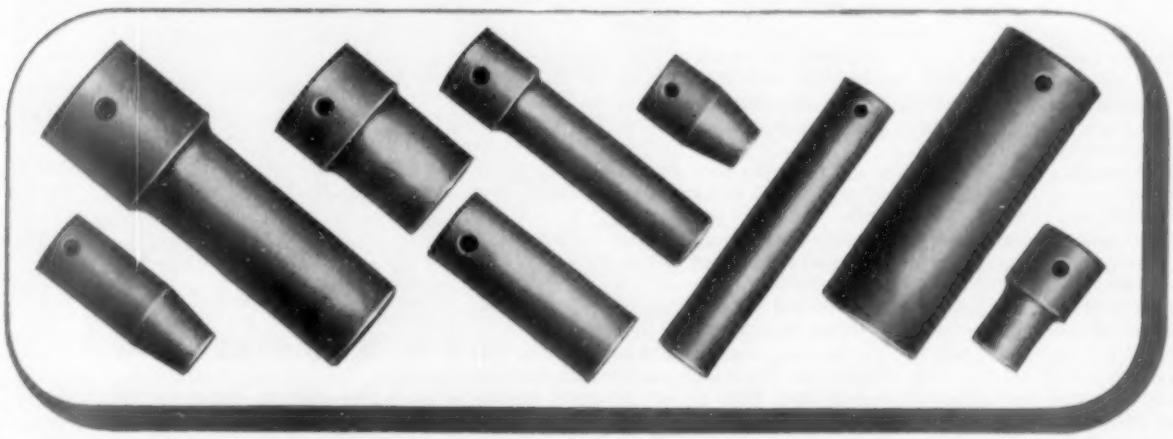
APEX "pin-through" SOCKETS


the safe way
to increase output
on multiple-unit
nut runners
Holes drilled through drive end of this Apex socket permit through-pinning to form a firm, positive bond between socket and tool anvil.

You can make certain you're getting the most work from your multiple-unit nut runners by using Apex "pin-through" sockets. Designed specifically for such use, these Apex impact sockets eliminate the troublesome, often dangerous, dropping off of sockets while tool is in operation.

Apex offers a full range of impact sockets for use on multiple-unit nut runners. Three basic types—straight, tapered and shoulder . . . standard or magnetic . . . square drives from 3/8" to 1". Available for use with hex nuts, cap screws, sheet metal screws . . . also offered in deep bolt-clearance type.

For your multiple-unit nut runners . . . and for all your nut running requirements, Apex alone offers the most complete line of impact sockets, extensions, adapters and universal wrenches. Catalog 29-R lists more than 5,000 stock types and sizes. Write today, on your company letterhead please, for your copy.



Ask **APEX** *for the answer to your nut running problem!*

THE APEX MACHINE & TOOL COMPANY

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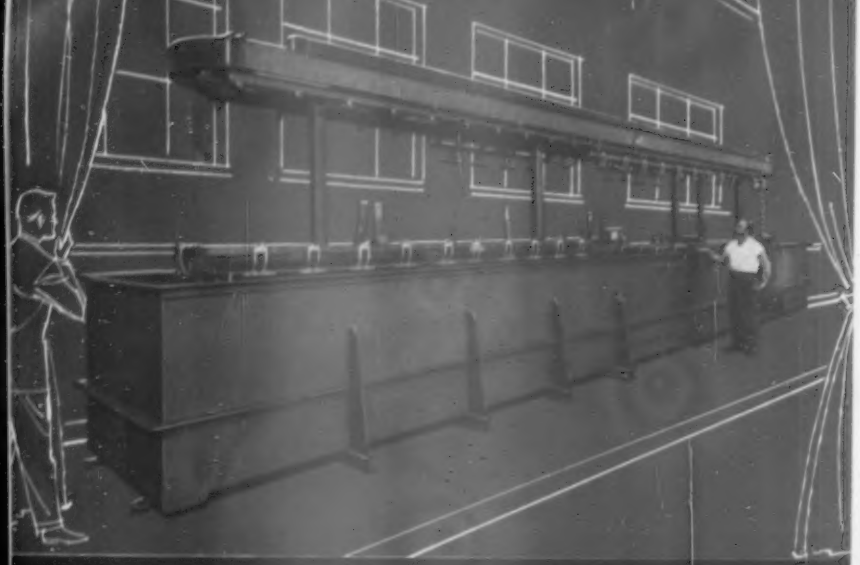

THE CYCLEMASTER
by UDYLITE
for High Production . . . Lower Cost Plating

Special alloy carriers for high conductivity.

Variable rack spacing —one man operation.

Compact design requires minimum floor space.

The Udylite Cyclemaster is a new, completely automatic plating machine which offers the greatest production of any machine built with comparable floor size.

A versatile, standardized machine, it is adaptable to most plating processes. The initial cost is low, considering its high production capacity. One man can keep it operating at full capacity.

The Cyclemaster will handle up to 120 racks per hour and take a rack up to 16" by 36". Being only 14 feet, 6 inches in length and moveable, it will fit into most straight line production operations.

All Cyclemaster units are equipped with a new multi-purpose carrier which can be used for double or single spline racks. Made of special alloy metal, it has high structural strength and highest conductivity.

Built on a rugged steel base, it is easily moved and installed. It can be shipped as a complete unit or in two sections which require only bolting together.

Like all Udylite automatics, the Cyclemaster is completely assembled at the factory and run in before being shipped. Each machine incorporates Udylite features of design and construction that have been so well accepted by the plating industry. The drive is hydraulic.

For more details of the Cyclemaster—or any other Udylite equipment—consult your local Udylite representative or write today to The Udylite Corporation, Detroit 11, Michigan.

THE Udylite CORPORATION

WORLD'S LARGEST PLATING SUPPLIER

FACTORY / CATALOG NEWS

Begins on page 138

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

49—Control Relays. A new line of sectional-pole, heavy-duty, 10-amp. units that occupy minimum panel space is described in 8-page Bulletin PL 7305-PM. Pictures 10 models. Data on dimensions, enclosures, features, maintenance and pole conversion. *Clark Controller Co.*

50—Adjustable Speed Magnetic Drive. Folder explains use of "Ampli-Speed" for fan-type and constant torque loads. Drawings show relationship of drive to magnetic amplifier control, the driving and driven load. Speed ranges, hp. ratings. *Electric Machinery Mfg. Co.*

51—Motors. Bulletin N-100-R tells why Series 100 is smaller, lighter, cooler running. Totally enclosed, fan-cooled, and open drip-proof types are shown. Discusses protected bearing construction with overlubrication check system. 16 pages. *Howell Electric Motors Co.*

52—Wall-to-Wall Lighting. Folder of 6 pages covers features, mounting and construction details, instructions for determining correct illumination intensity of "Overall Illumination" system. Cutaways show how it adapts to all ceilings. Form 800. *Smithcraft Lighting Div.*

53—Cable and Tubing Supports. Two bulletins are offered. One gives highlights of a system that saves engineering, drafting, installation time. Bulletin 955-D (16 pages) describes and illustrates components and accessories. Sizes listed. *P-W Industries, Inc.*

AUXILIARY

54—Blower. Subject of this folder is the "Standaire," an axial-flow, positive-displacement unit for handling air or any other gas under either pressure or vacuum. Cutaway photos, cross-section diagrams, performance charts, selection tables help tell the story. Publication B-154. *Read Standard Corp.*

Turn the page

Moisture-resistant. K&M Apac sheets are used on the ceiling of this toll entrance and custom office inspection enclosure at the Port Huron, Michigan, Blue Water International Bridge. The moisture in the air at the bridge won't harm them.

You'll be wise to choose

K&M APAC

Asbestos-Cement Sheets

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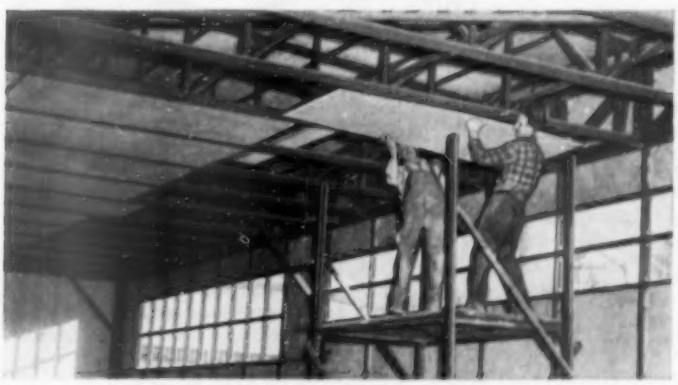
Interiors—Exteriors

Remarkable economy!

Temperature, humidity safeguards. Walls of K&M Apac sheets give dependable aid to a cigar manufacturer in an important process—where temperature and humidity are accurately controlled.



All-purpose sheets. This photo shows K&M Apac sheets being applied on a building where they are used for both outside and inside walls as well as for ceilings.

You'll find a thousand and one uses for these flat asbestos-cement sheets: as an interior and exterior siding, office paneling, plant and office ceilings, machine shop sheathing, stock room sidewalls, basement partitions, linings for elevator casings. Use them almost everywhere, inside and outside.

Built to last. K&M Apac sheets are made of two practically indestructible materials, asbestos fiber and portland cement. They won't burn, rot, or corrode. And they never need protective paint.

Look over the illustrations. See a few of the many places where Apac sheets are applied. Then contact your K&M distributor, and ask him to tell you more about low-cost K&M Apac sheets. Informative folders also available on request. Address inquiries to our headquarters in Ambler, Pa.

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Buffing is for the birds.
It wastes time, money and labor.
LEGSURE polishes itself as it goes on your floors. It's slip-resistant, scuff-resistant, dirt and water repellent. Gleams like a new penny, wears like a million.
For all resilient floors.
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FACTORY / CATALOG NEWS

Begins on page 138

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

55—Dryers. A line of desiccant type units for drying air, gases, and liquids is presented in 40-page Bulletin D-100. Explains 26 principal variables of dryer design, effects of temperature and pressure on size needed. Offers 56 models. *C. M. Kemp Mfg. Co.*

56—Boilers. 22-page Bulletin 55-1 contains 14 pages of engineering drawings illustrating boilers ranging in capacities producing up to 500,000 lb. of steam per hour on standard fuels. Includes units for waste heat; for utilizing refuse for fuels. *Wickes Boiler Co.*

57—Power Package. Catalog MS-455 covers design, engineering, and performance of a four-cylinder, 60-hp. unit. Includes specifications, cutaway views of units and components, photos of three models. Lists special and extra equipment. 8 pages. *Allis-Chalmers Mfg. Co.*

58—Solvent Recovery. 36-page booklet presents technical data on the activated carbon system. Discusses efficiency and economy of recovering solvent vapors in a variety of industries. Data on equipment, typical solvents. Form 4410D. *Carbide and Carbon Chemicals Co.*

MATERIALS HANDLING

59—Overhead Equipment. Engineering and application Booklet 2008-L provides an analysis of stresses in a number of types of overhead tracks. Shows track switches, carriers, tractors, cranes, automatic handling systems, interlocks, etc. 12 pages. *Cleveland Tramrail Div.*

60—Wirebound Crates. How to pack hard-to-pack products is the subject of this 8-page booklet. Case studies show many products with weird shapes, bulky weight, projections—a revolving door among them. Includes 1954 National Packaging and Materials Handling Competition prize winner. *General Box Co.*

Turn the page

making a
MARKED IMPROVEMENT
in COLOR
CODING products

Industry's color-coding needs range from simultaneous application of up to six bands on wire lead electrical components to color banding drill chucks in the tool business. Meeting these needs are Markem machines (like the 69A shown), type and ink—which do the job faster, better and at lower cost than tedious hand methods ever could. When size, shape or material of your product, part or package poses a marking problem, get the benefits of Markem's 44 years of experience. Write or call Markem Machine Co., Keene 18, New Hampshire.

MARKEM ...TO MAKE YOUR MARK

Tuffy® SLING NEWS

Vol. 1 — Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. — No. 3

NEW FERRULE EYE SPLICE FEATURED

In Big, New Tuffy Sling Handbook Just Off Press-FREE

First editions of this handbook were so popular that 85,000 copies circulated to sling users. If you use or buy slings—if you're a plant engineer, safety engineer or purchasing agent—you'll find this new, enlarged edition of the Tuffy Sling Handbook the most comprehensive ever published.

It tells you all about the new factory-fitted slings added to the Tuffy line. It shows why the new Tuffy pressed-on ferrule makes Tuffy slings faster, safer, and easier to load and unload than ever before. Many of the fittings—clamps, hooks, bridles, thimbles, saddles—are new, too. And this latest edition of the Tuffy Sling Handbook contains a host of other useful information: a complete rigger's manual, proof tested ratings and specifications for all Tuffy Slings; a new engineer's notebook; data tables on a full line of versatile, easy-to-apply sling fittings.

But don't delay to order your *FREE* copy. Mail the coupon to us now. We'll send it to you by return mail with Tuffy's compliments—nothing to buy, no obligation. Hurry. The supply is limited!

YOU CAN'T HURT A TUFFY SLING

Loop it, pull the loop taut. Tuffy's 9-part machine braided wire fabric construction resists kinking. But if you *are* able to kink it, you can straighten it out quickly and without materially damaging the fabric.

New Tuffy® Ferrule Makes Sling History

It's on all Tuffy Slings, but it doesn't cost you a penny extra. There's no sling ferrule like it anywhere. Tuffy's streamlined metal ferrule is set on the eye splice under pressure so great that the inner metal virtually flows into the voids between the wire fabric. A force of friction is created so great that the eye splice has strength equal to that of the famous machine braided Tuffy wire fabric. It makes Tuffy Slings stronger. It makes them safer: The ends of the tapered ferrule are swaged tightly to the fabric leaving no edges to hang up on loads or to injure workers' hands in hitching to and unhitching from sling loads. There's still another advantage—because Tuffy Slings are easier and safer to load, they're also faster to load. Your men can do more work when they're working with Tuffy® Slings.

CONSULT YOUR DISTRIBUTOR

when you want to buy Tuffy Slings or Tuffy Hoist Lines. Give him your requirements. He'll stock an inventory for you to draw against. It saves you time and money.

New Tuffy® Ferrule

has no sharp edges to injure hands or catch on loads. The tapered and rounded ends are swaged tight to the sling fabric. The tremendous pressure at which the ferrule is pressed around the machine braided wire fabric flows the metal into the voids of the eye splice and gives the eye splice 100 percent of the strength of the fabric.

union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

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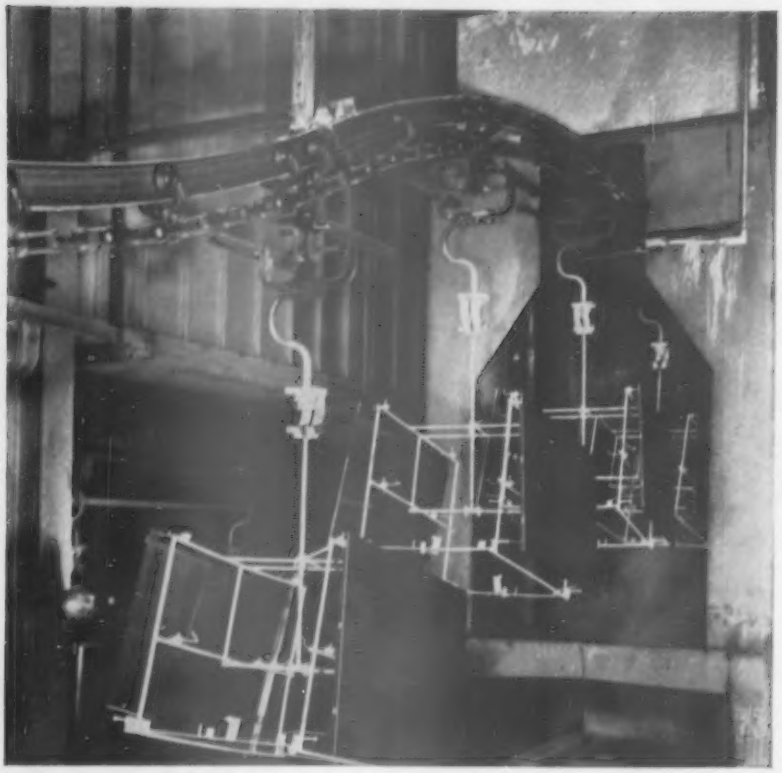

After 12,000 hours of drenching and baking, MHS Monoveyor is in top condition

The 4500 foot Monoveyor, shown above as it enters a washer, has carried parts in a white paint line 16 hours a day for three years. It operates through sprays of hot and cold water, through cleaning and phosphating chemicals, through high temperature drying and bake ovens.

MHS engineered the Monoveyor to meet and beat these brutal conditions. Special trolley wheels were installed. Automatic lubrication was designed to oil wheels and moving parts on each round trip.

Engineering, manufacture and installation was so skillfully done that the customer reports "only normal maintenance" in three years of operation.

An MHS Monoveyor may be what your plant needs for economical materials handling. It costs nothing to find out! *Call in the MHS engineer.*

Mechanical Handling Systems Inc.
AND SUBSIDIARIES
4608 Nancy Ave., Detroit 12, Michigan
Offices in Principal Cities
FACTORIES: Detroit, Mich. • Fairfield, Iowa • Albany, N. Y. • Windsor, Ontario

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

61—Fork Lift Truck. Fact folder details advantages; highlights features of 5000-lb. capacity series available in gas, LP-gas or diesel engine. Lists wide range of standard accessories and optional equipment available. Specifications and operating data. *Towmotor Corp.*

62—Pallet Truck. A "walkie" electric truck ("Short-Coupled Jack-Lift") is featured in Circular 34C. Specifications are listed, plus data on aisle width requirements and grade clearance. Drive unit and components are described. Diagrams. *Lewis-Shepard Products, Inc.*

63—Floor Trucks. Jr. Catalog 56G illustrates 49 models of two-wheel and platform trucks, 12 types of dollies, 15 styles of casters. Information on balance style trucks for trailer-train operations. Application photos and specs. 12 pages. *Nutting Truck & Caster Co.*

64—Tote Bins. Slim-Jim folder presents eight case studies covering bulk handling of flour, sugar, cake mixes, carbon black, phosphor powders, cement, other materials. Describes railroad container car unveiled jointly by Tote and Shippers' Car Line. *Tote System, Inc.*

65—Automatic Feeders. Brochure features elevating, blade, rotary, and vibratory types of feeds, plus elevating transfer and through-feed conveyors, with which they can be combined for automatic feeding. Covers seven basic models. Includes photos. 16 pages. *Feedall Inc.*

PIPELINES & FITTINGS

66—Hose Couplings. This 20-pager features the "Quick-Seal" line of quick connect-disconnect couplings. Full-page cutaway views reveal design and construction features. Describes single- and double-check valve modifications. Data on safe operating pressures. Many tables aid selection. *Titeflex, Inc.*

Turn the page

Like Sound Couplings?

GET NE Sherarduct

RIGID STEEL CONDUIT

Sound couplings . . . that's another big Sherarduct advantage!

Sherarduct's accurately cut threads let conduit ends butt inside the coupling . . . eliminate gaps that interfere with easy fishing. This provides a sound, thoroughly grounded coupling, sealing off moisture and corrosion.

The couplings are fortified by the same Sherardizing process of dry galvanizing that provides lifetime protection for Sherarduct conduit. Sherardizing actually alloys pure zinc with the steel wall of the conduit (including the hills and valleys of every thread), providing a permanent barrier to corrosives.

During the Sherardizing process, the steel conduit is normalized by gradual heating and cooling. Thus the conduit can be easily bent and formed on the job without springback or deformation.

After Sherardizing, a special clear acid-resistant coating, called Shera-enamel, is baked on inside and out. This completes the protection of all surfaces from corrosion, and produces a smooth raceway for fast, easy fishing of conductors.

LIFETIME CORROSION PROTECTION
•
EASY FISHING
•
ZINC PROTECTED THREADS
•
STRONG COUPLINGS
•
THOROUGH GROUNDING
•
EASY BENDING

Write today for your free Sherarduct facts book . . . see why Sherardizing makes Sherarduct "galvanized conduit at its best."

Sherardizing is galvanizing at its best . . . Sherarduct is galvanized conduit at its best

Listed by Underwriters' Laboratories, Inc.

National Electric Products

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DEXTER
AUTOMATIC METAL SHEET FEEDER

Metal sheets, automatically separated, picked up and advanced one at a time to feeding—in point of machine to which it is attached at speeds up to 150 sheets per minute.

Should two sheets adhere, they are automatically transferred to a reject tray. Rubber suction mouthpieces and drop rollers prevent scratching.

Standard Feeder handles metal sheets from 14" x 18" up to 36" x 44" between 24 and 38 gauge stock. Feeders for larger size and heavier gauge metal sheets also available.

Continuous reloading avoids machine stoppage. New loads are placed in feeding position, while machine is operating, thus maintaining continuous automation cycle.

Dexter Feeder may be attached to Metal Litho Presses, Coating Machines, Sorting Machines, Shears, Slitters, Sprayers, Punch Presses, Stove Pipe Machines, Buffers and numerous other metal working machines.

Custom built sheet feeders for handling paper, cardboard, corrugated and other types of sheets are available to meet specific requirements. Inquiries invited.

DEXTER

DEXTER
FOLDER COMPANY
General Sales Offices
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NEW YORK 36, N. Y.

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67—Pipe Threaders, Cutters, Grooovers. Quick-reference catalog describes threaders, a lightweight ratchet, threader, a high-speed portable pipe machine, power grip chuck, quadra-type diehead, power drive, quick-opening quadra-type threader. *Beaver Pipe Tools, Inc.*

68—Hose Couplings and Fittings. Types covered in this data sheet are short and long shank common couplings, barbed insert, quick-acting, bar-way reattachable, interlocking high pressure, "Permalock" reattachable units. Specs and recommended uses. *B. F. Goodrich Co.*

MATERIALS

69—Copper Base Alloy Rod. 28-page engineering manual presents a wide range, from standard free-cutting variety to many special alloys. Covers chemical composition, mechanical and physical properties, machineability ratings, corrosion resistance. *Mueller Brass Co.*

70—Plastics and Resins. Reference file describes over 50 under headings: molding materials, extrusion materials, laminating plastics, bonding materials, vinyl calendering materials, protective coating resins, flexible packaging, flexible and rigid sheets. *Bakelite Co.*

71—Ductile Iron. 28 pages of tables, charts, and photos on this cast iron that can be bent. Application photos of castings show a few of its many and varied uses. List cites typical applications in eight different fields. Properties discussed. *International Nickel Co.*

INSTRUMENTS & CONTROLS

72—Contour Projectors. Six models are described and illustrated in this 12-page brochure. Discusses use of optical gaging in the toolroom, in production, in receiving and in final

give your clients this **Flexibility** in **AUDIBLE SIGNALS**

specify FARADAY UNI-PACT

12 different sound instruments all fit one adapter plate

Businesses change. Noise levels go up and down. Uni-Pact signal systems let you provide for these changes . . . in advance! "Quick change" horns, buzzers, bells, chimes — from 75 to 100 decibels Nema Standard at 10 feet — all plug into one standard adapter plate. Safer too. No exposed terminals in dead-front adapter plate. Plan flexibility. Specify Faraday signal systems. And rely on Sperti Faraday for the best in:

Annunciators • Door Openers • Transformers • Contact Devices • Sirens Synchronous Clocks • Fire Alarm Systems • Electric Clock Sysstms • Freezer Alarms • Plugmaster Cord Sets.

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how many uses for DEXION in your plant?

RACK

DINING TABLES

STORAGE

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TABLE AND BINS

FILING TABLE

Easy to cut. One stroke of DEXION cutter saves time.

Simple to connect. Use only two wrenches.

DEXION panels. For shelving to support heavy loads.

Re-usable. Dismantle—re-build into other equipment.

Here's why you'll want DEXION Slotted Angle over any other framing material

Only your imagination limits the applications of this ingenious slotted angle framing material. Users discover that they can build whatever they need—when they need it—and build it cheaper! Easily dismantled, DEXION Slotted Angle can be *reused* in new ways to meet changing needs. There's no waste! And anyone who can use a wrench and a saw (or DEXION cutter) can build with this precision-made slotted angle.

DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".

Easy to store. DEXION package occupies approximately 1 cubic foot of space

GET the exciting new **DEXION IDEA BROCHURE,** which gives you full information. Write direct to the address shown below, Dept. 1-A.

DEXION DIVISION

ACME STEEL COMPANY

2840 ARCHER AVENUE, CHICAGO 8, ILLINOIS

ACME STEEL

Opportunity for Industry

LAKELAND

Businessmen of Lakeland, Florida will cooperate fully and furnish complete information to manufacturers who will consider relocating or establishing a branch unit in this fast growing central Florida city.

Lower operating costs are possible in Lakeland for many reasons. Friendly labor, unusual tax advantages, and low building costs are especially attractive to small or medium industries.

In the past few years, Florida has become a major consumer and is still growing rapidly. Lakeland is located almost exactly in the center of this new market.

Write to:
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HUB OF FLORIDA'S FASTEST GROWING INDUSTRIAL AREA

BROOK MOTORS
FOR EVERY REQUIREMENT
1 TO 500 H.P.

Write for this Helpful Bulletin

Describes and catalogs the more popular sizes of Brook a.c. motors—World's Most Respected Motor. Surpass NEMA specifications, yet cost less than ordinary motors. Single phase and polyphase.

Available in Open Drip Proof or Splash Proof, Totally Enclosed Fan Cooled, Totally Enclosed Non-Ventilated, NEMA "C" Flange, Extended Shaft Pump Motors and other types—all built better to deliver power at minimum cost.

FAST DELIVERY OF ALL POPULAR MODELS

Brook Motors are available from warehouses at: Chicago; Miami, Fla.; Jersey City, N. J.; Houston; Dallas; Los Angeles; San Francisco; Seattle; Salt Lake City; Savannah, Ga.; and other major distributing points.

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Consult Your Brook Motor field engineer.

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3553-55 W. Peterson Ave., Chicago 45, Ill.

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inspections. Lists accessories. Full page of specifications. *Eastman Kodak Co.*

73 — Trip Controls. Everything needed to convert unsafe, fatiguing, manually operated machines to fast, safe, easy power operation is pictured and described in Catalog 65. Covers electric two-hand clutch controls. Shows control boxes and switches. 12 pages. *Micro Switch.*

74—Dynamic Balancing. Information on the latest technological advancements that enable dynamic balancing to improve maintenance work and production techniques. Many questions are answered with the aid of tables, diagrams, and application photos. *Bear Mfg. Co.*

75 — Non - Destructive Testing. "Lower Manufacturing Costs" discloses how a non-destructive testing program in production can be a cost-reducer, money-saver. Discusses problem of sampling vs. 100% inspection. Case studies. 8 pages. *Magnaflux Corp.*

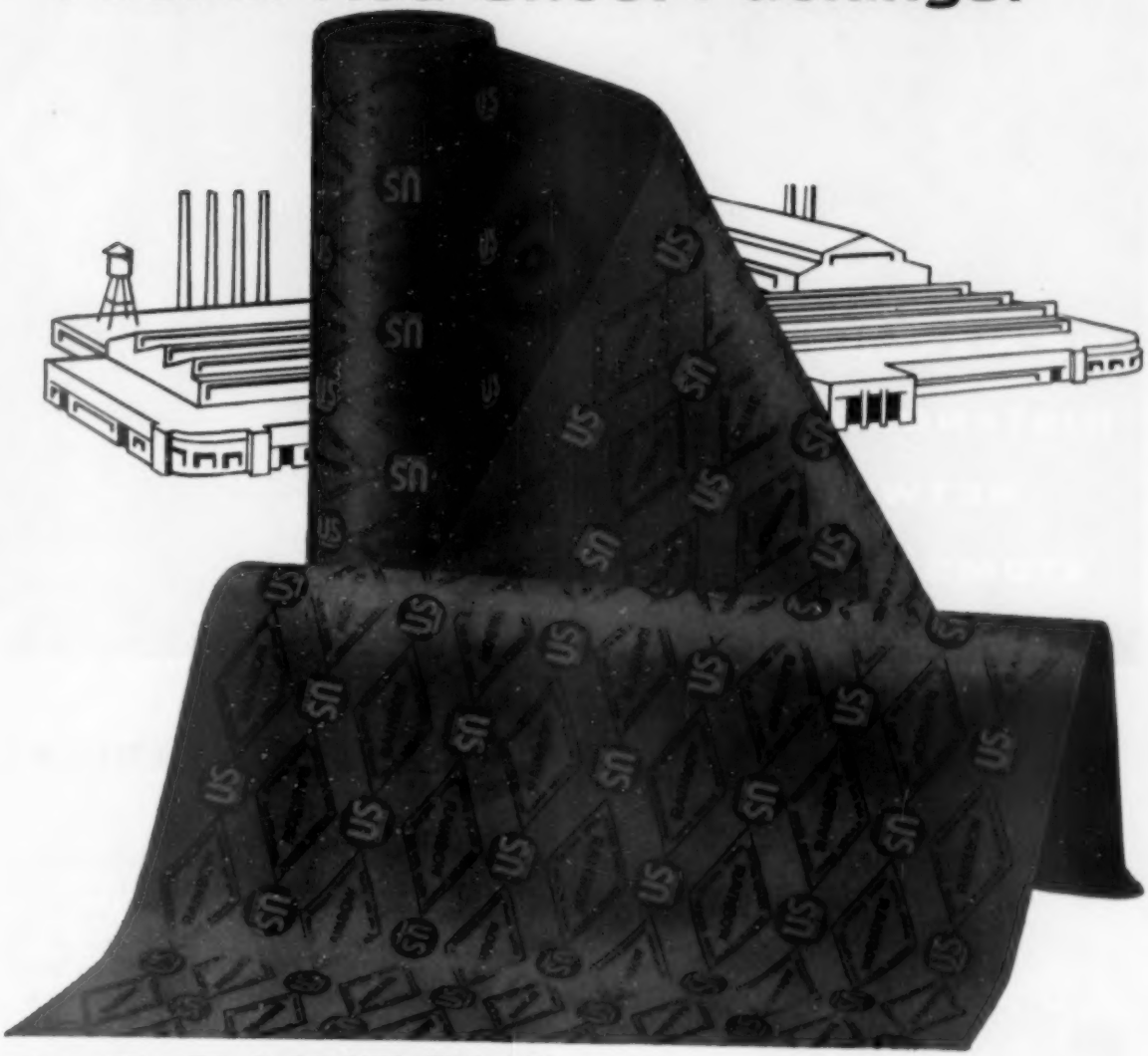
MISCELLANEOUS

76—Scale Models. "Move models—not tons of equipment" is the theme of this 7-pager. Tells how you can cut layout and planning costs and time 70% with tri-dimensional models. Photographs show typical layouts. *Model Planning Co.*

77—Pressure-Sensitive Tapes. Properties, specifications, and applications of a complete line are covered in this well-illustrated 25-page brochure. Includes such applications as strapping, masking, electrical, textile, freezer, drafting, etc. *Behr-Manning.*

78—Insulation of Steel Buildings. This 12-page catalog will show you how to increase the usefulness of Milcor "Lok-Rib" buildings by the addition of Fiberglas insulation on walls, ceilings, and floors. *Inland Steel Products Co.*

First in Red Sheet Packings!



U.S. RAINBOW

The *First* Red Sheet Packing ever made—and always the *first* choice of industry ever since!

Here's why Rainbow has never been matched:

(1) Will not blow or squeeze out in service.

(2) Is pliable enough to fill up any irregularities in the flange—and is highly resilient.

(3) Has the proper firmness to make a tight joint.

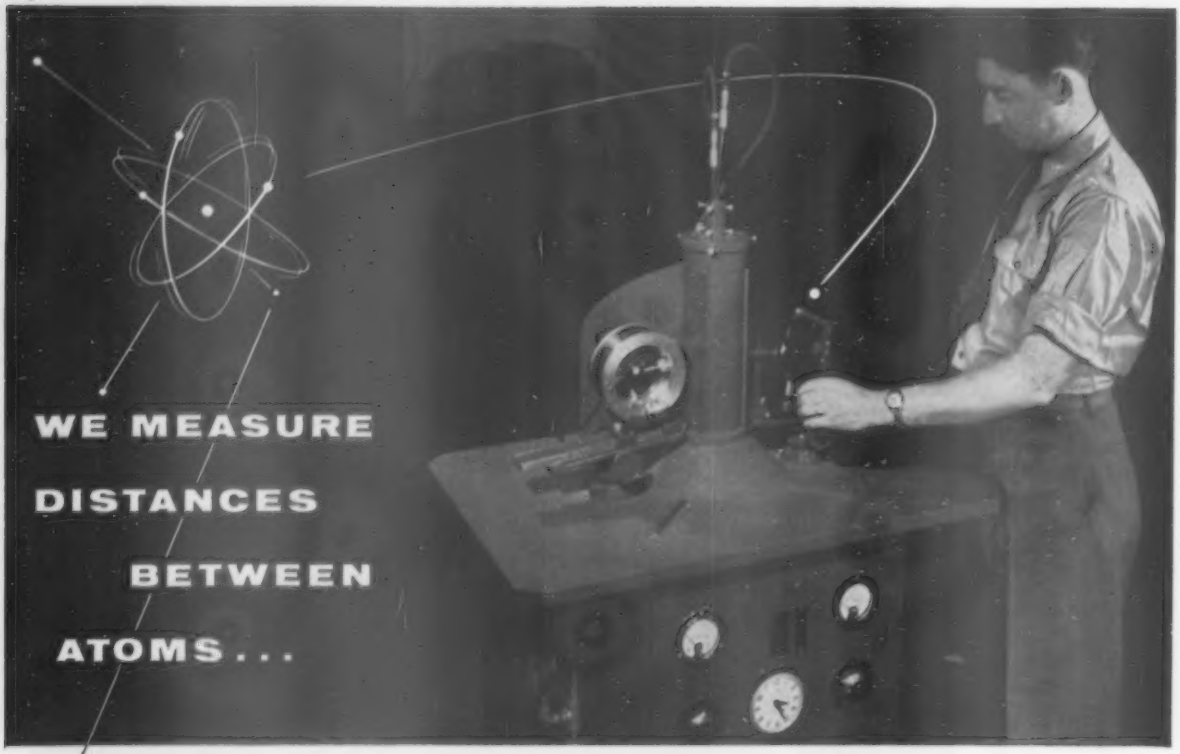
U. S. Rainbow® is designed for packing flanges and other parallel surfaces against hot or cold water, air, saturated steam pressures up to 150 pounds, and all hydraulic conditions.

Call any of the 27 "U. S." District Sales Offices or write us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber



TO GIVE YOU *Advance Design* BATTERIES!

The X-Ray Diffraction Unit shown above is one of the few instruments of its kind being used in basic battery research. It identifies complex metallic compounds which cannot be identified practically by chemical means. It does this by actually indicating on film the distances between atoms, enabling Gould engineers to study atomic structure.

This instrument . . . this research . . . is revealing hitherto unknown facts about the relationship between molecular activity and battery performance . . . pointing the way toward more powerful, longer lasting active materials. That's why you get *better* batteries when you buy Gould!

For the full story on Gould Research, send for Booklet 749.

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Industrial
Truck Batteries

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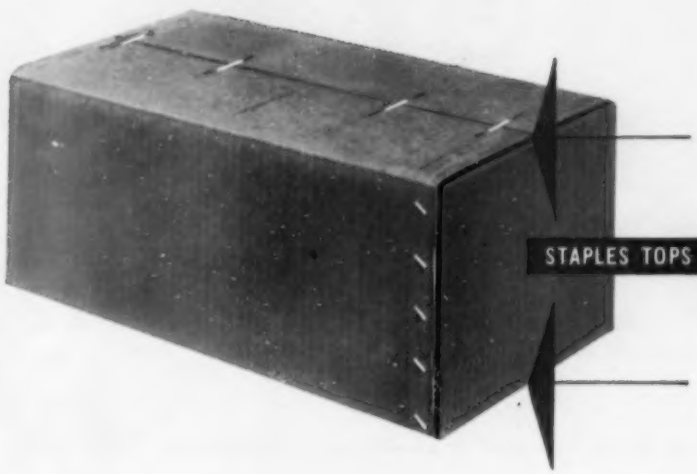
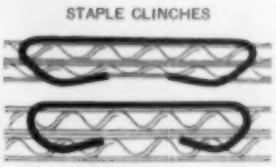
"BETTER BATTERIES THROUGH RESEARCH"

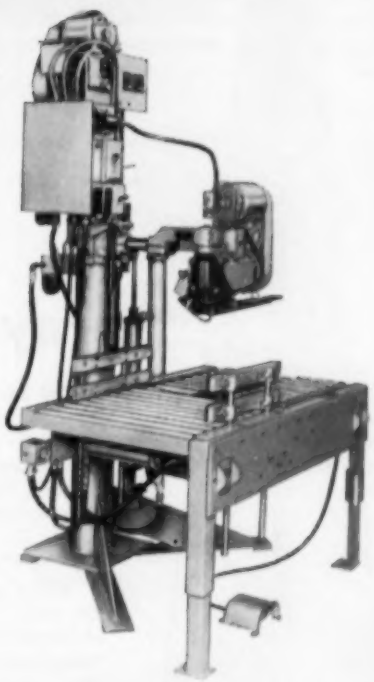
Always Use Gould-National Automobile and Truck Batteries

New BOSTITCH BOXLOK seals your containers faster, more securely





STAPLES TOPS AND BOTTOMS IN ONE PASS



- Tightly seals top and bottom flaps of regular slotted and overlapped containers . . . with wide-crown staples of .090 x .040 wire . . . requiring fewer staples per box . . . driven and clinched from the outside.
- Tops and bottoms stapled simultaneously—or tops only, if desired—at rate of over 100 stapling strokes per minute. Swivel heads permit quick change from diagonal stapling on overlapped flaps to right-angle stapling across flaps that meet. Separate ½-h.p. motor for each head.
- Cartons automatically centered to line up staples. Adjustable split centering device releases carton to permit free movement after each staple is driven.
- Staples automatically driven when the head lowers and contacts the carton.
- Cartons of varying widths, heights and lengths can be stapled without adjustment.
- Wearing parts easily accessible for quick replacement. Little service required.
- Meets requirement of parcel post, freight, overseas shipments.

BOSTITCH BOXLOK TOP AND BOTTOM STAPLER Model D12BT for use in conveyor lines. Other models for smaller production requirements.

For specifications and other information, send coupon below

Fasten it better and faster with

BOSTITCH
STAPLERS AND STAPLES

BOSTITCH, Inc., 601 Mechanic St., Westerly, R. I.
Please send descriptive folder on new Bostitch Boxlok.

Name _____
Business _____
Address _____
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Without clearing area below, a Hanks' painter sprays 550' radio tower.

In painting towers or tanks, refineries or plants—noted contractor reduces costs with DeVilbiss equipment, states . . .

Stanley Hanks

"Spray mist no longer a problem"

In the immediate area are offices, stores, truck terminals, and over 1000 parked cars. Yet — using two DeVilbiss MBC Spray Guns — five of Stanley Hanks' painters climbed this 550-ft. radio tower, painted it in alternating 40-ft. strips of white and orange . . . without a single damage claim from spray mist!

"We've used DeVilbiss spray equipment for years, and have proved that proper technique and today's improved materials make outdoor painting highly practical and safe," says Mr. Hanks — owner of the Stanley Hanks Painting Co., Pinelawn, Mo., and president of the Stanley Hanks Painting Corp., Kansas City, Mo.

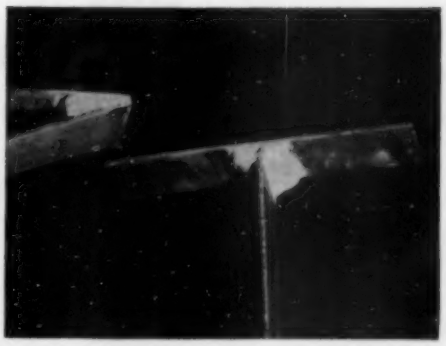
"*In spraying* several structures this past year, including towers, bridges, and industrial plants, there was not a single damage claim due to spray mist. *And we never cleared the area below our work!* The new paint we use (which can be applied only by spray) dries well within 30-ft. of the gun tip — a safe factor even in a moderate wind.

"There are many jobs, indoors as well as out, that can be handled only by spray, and others where if given the choice we prefer the gun over other methods. For DeVilbiss spray reduces painting costs; provides smoother, better-covering finishes. And because it's much faster, DeVilbiss spray lets you do a complete job on a weekend or at night, so as not to interrupt a company's work schedule."

How about you? Whether your painting assignments are indoors or out, whether surfaces are rough, smooth, flat or irregular — you'll apply better finishes, in less time, at lower cost, with DeVilbiss spray. Write for *Catalog M-50.* Or call your DeVilbiss supplier. *The DeVilbiss Company, Toledo 1, Ohio. Offices in principal cities.*

FOR BETTER SERVICE, BUY

DEVILBISS



EASY-TO-SPREAD ADHESIVE is useful for production-line fastening of metal parts, bonding metals to ceramics and other non-metals, and for filling voids.

Multi-Purpose Adhesive Paste

This strong, curing-type adhesive filler requires no mixing—stays put without flowing or running.

Bondmaster M620 has high strength for bonding metals to metals, or to rigid materials like glass or plastic. It's a single-component epoxy adhesive that can be used right from container — eliminating mixing of separate resin and hardener.

Special feature is its "thixotropic" consistency: Spreads like butter to exact form and thickness desired, yet won't flow, drip, or run during cure. This eliminates "post-cleaning" of bonded parts, filling of voids around "poor fits."

Material contains 100% solids—no solvents. When hard it is chemically inert, resists strong acids, and can be machined as desired. Time and temperature for cure can be varied from 7 minutes at 535 F. to 24 hours at 260 F.

Rubber and Asbestos Corp. (Circle 1, Reader Service Card.

Anti-Rust Papers Now Heat-Sealable

A new type of chemically treated paper has been developed for companies now hand-wrapping parts to prevent rust and corrosion. The heat-sealable feature permits conversion to automatic or semi-automatic packaging operations. (For details, see items 2 and 3.)

Turn the page

Maintenance COSTS too high?

DeVilbiss Spray Outfits cut painting costs ½!

Now, save time and materials on maintenance-painting jobs with a DeVilbiss Spray Outfit! Your maintenance men can fully cover any surface – rough or smooth, flat or irregular – in ¼ the time or less. And you'll avoid work stoppages, too, because with DeVilbiss equipment you can paint while the plant is in operation. Call your DeVilbiss supplier today for trouble-free DeVilbiss spray guns, hose and connections, compressors, paint tanks, and spray-painting accessories.

One-man, 1-hp outfit

Complete portable outfit for medium-sized jobs. Electric motor, or 2-h.p. gas engine.

One-man outfit
(without compressor)

For medium-sized paint jobs. Enough hose for 75-ft. reach. Hooks right into your existing compressed-air line.

Spray gun and paint cup

For those hundreds of odd painting jobs in every plant or office. Hook into your compressed-air line with simple air hose. Actually costs less than some brushes!

THE DEVILBISS COMPANY
Toledo 1, Ohio

Santa Clara, Calif.
Barrie, Ontario
London, England

FOR BETTER SERVICE, BUY DEVILBISS

BRANCH OFFICES IN PRINCIPAL CITIES

machines last longer... *wear reduced as much as* **80%**

when **TORIT** *traps damaging dust*

Dust causes wear. Torit Dust Collectors trap that dust at its source, keeping bearings, bedways, slides and saddles clean. Clean machines hold close tolerances better, and need re-grinding or alignment only 1/5 as often. Since re-grinding the ways on the average grinder costs about $400, in five years a Torit Dust Collector can save you up to $1600 in maintenance alone, plus hundreds of dollars in down-time.

easy to install | *easy to move* | *easy to operate*

Torit Dust Collectors are self-contained units. That makes them easy to install, and easy to move when machines are relocated. Torit Dust Collectors can be wired through the starters of the machines for automatic operation. This also saves power. Filtered air may be returned to the room to conserve heat. For more information on how Torit Dust Collectors save you money, write today to

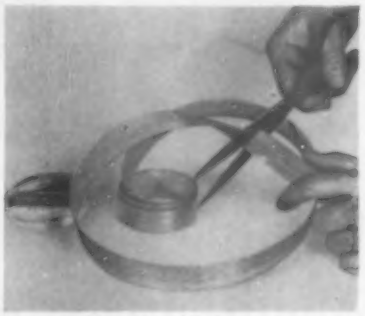
TORIT MANUFACTURING COMPANY
304 Walnut Street, St. Paul 2, Minnesota, Dept. 304

FACTORY / EQUIPMENT NEWS
Begins on page 247

For more about these products, circle item numbers on Reader Service card next to back cover.

2—Heat Sealable VPI (vapor phase inhibitor) is a 35-lb. Kraft sheet coated with two grams of VPI per square foot. Available in standard rolls, 36 in. by 200 yards; also in narrower rolls and sheets. Meets Bureau of Aeronautics specification MIL-P-3420. Samples and recommended heat-sealing procedures available on request. *Orchard Paper Co.*

3—Heat Sealable VCI (volatile corrosion inhibitor) is designated No. 70. Augments the company's standard grades of vapor wrapper for industrial and military packaging of spare parts, tools, and machines. *Daubert Chemical Co.*

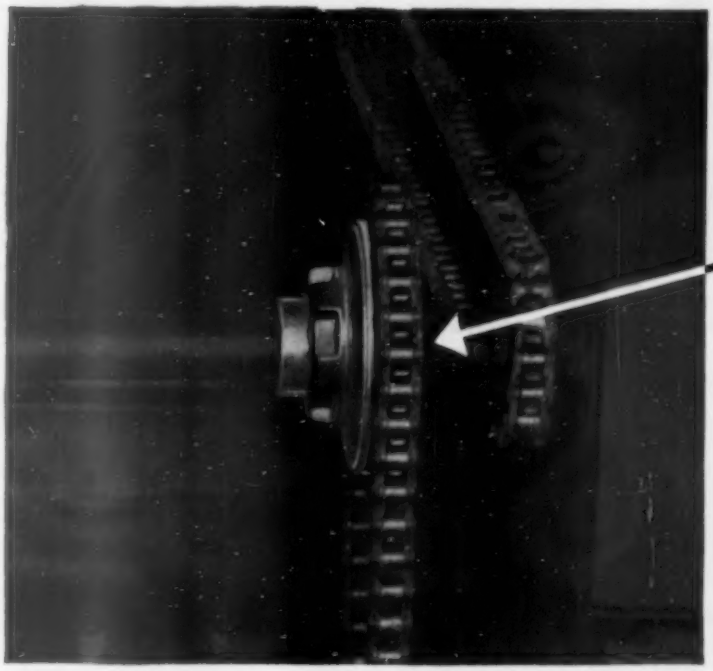


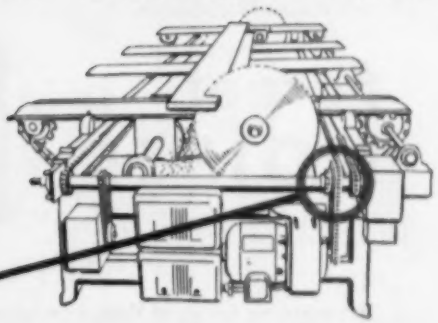
4—Flexible Wood Trim can be used to cover exposed plywood edges. Consists of a 1/85 in. veneer on a latex-impregnated paper backing. Can be glued in place using any good wood glue—without application of heat or pressure. "Weldwood" trim is available in one-inch widths, in mahogany, oak, walnut, birch, Korina. *United States Plywood Corp.*

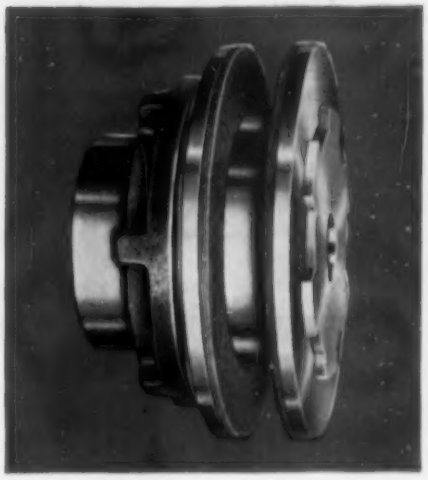
5—Zinc Coating can be applied by either brush or spray gun. For use in renewing galvanizing parts that have lost their original protective coating—or for applying zinc protection to standing parts that could not otherwise be coated. *Wilbur & Williams Co.*

6—Boothguard is a spray-on, strip-off protective coating for paint spray booths and other dirt-collecting areas in the plant. The non-flammable, non-toxic liquid is easily

MORSE TORQUE LIMITER PROTECTS MOTOR AND REDUCER FROM DEAD-STOP OF DRIVEN UNIT!







Morse Torque Limiter and sprocket act as slip clutch on Model 55 Automatic Electric Shift Trimmer made by The Wheland Company, Chattanooga. Arbors are shifted at 120 fpm, instantly stopped and locked into place. Torque Limiter on jackshaft is set so sprocket slips when motor torque (38 ft.-lbs.) is exceeded. Absorbs inertia of 1-hp, 155-rpm gearmotor; reduces shock on drive unit when driven shaft is stopped.

Typical application shows how you can safeguard drive units and eliminate shear pins

Check these advantages of Morse Torque Limiters

- √ Eliminate downtime
- √ Torque-sensitive and fully adjustable
- √ Completely automatic and dependable
- √ Resume operation automatically
- √ Compact, standard sizes

In this Wheland Electric Shift Trimmer, two 200-pound saw arbors are automatically moved into position at 120 feet per minute . . . then stopped dead and locked into place.

The tremendous shock transmitted to the drive mechanism when the arbors are stopped, is safely dissipated by a Morse Torque Limiter used as a slip clutch between the driving and driven units. In addition, it prevents motor inertia from building up torque in the drive.

Versatile Morse Torque Limiters can safely control many of the shock-load problems present in your machine operations.

These simple devices are dependably sensitive and easily adjusted to desired torque limits. When overload or jam-up is cleared, they automatically resume operation, eliminating downtime or dismantling necessary with shear pins.

Send for Free Catalog

A full line of Torque Limiters is stocked by your Morse Distributor. For free catalog, or power transmission engineering help, see him or write today.

MORSE CHAIN COMPANY • INDUSTRIAL SALES DIVISION • ITHACA, N.Y.

MORSE

BW

CHAINS, CLUTCHES, AND COUPLINGS

Noise levels are no obstacle to this safety signal! Nail mills, boiler factories, shuttle rooms no longer present a signalling problem.

Forget NOISE!

27S BEACON RAY

The warning beam of light from this Beacon Ray will penetrate through any noise levels! Rotating through 360° this concentrated beam will reflect off any bright surface to warn the unwary even though they may be facing the other way.

With or without audible signals in service a Beacon Ray with it's greater intensity and range will pinpoint the location of danger. An audible signal will fail to do this. Write for full details on the new low-cost Federal 27S Beacon Ray warning light.

FEDERAL SIGN and SIGNAL Corporation

8716 SOUTH STATE STREET CHICAGO 19, ILLINOIS

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Latest *Ideas, Methods, Practices* in Planning—Maintenance—Management—Design

HANDBOOK OF INDUSTRIAL ENGINEERING and MANAGEMENT

by W. GRANT IRESON & EUGENE L. GRANT

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FACTORY / MATERIALS NEWS

Begins on page 247

For more about these products, circle item numbers on Reader Service card next to back cover.

sprayed in place—quickly dries to form a thin, white film. When paint overspray accumulates, the film can be quickly peeled off in large sheets. *Guard Coatings Corp.*

7—Titanium is becoming less expensive as uses for the strong, lightweight material continue to grow. The sponge metal has recently been reduced 30 cents (to $3.45) per pound—making a total price reduction of $1 in less than eight months. All titanium mill products have also been reduced significantly. *Titanium Metals Corp. of America.*

8—"Custom" Adhesives and other industrial coatings can be made to suit your exact requirements. For example, cements for bonding electrical components, wood, plastics, metals, fabrics, glass and other materials. Can be made with various opacities and drying rate—permitting application by brush, dip, squeeze bottle, air-pressure extrusion, or spray. *Merad Laboratories.*

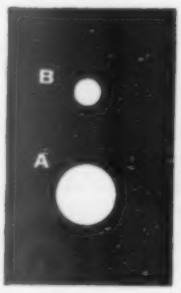
9—Mono-Seal paint is virtually indestructible. Covers most materials in one coat—no primer or bonderizer required. Can apply 18 standard colors by brush, spray, roll, or dip. Dust dry 15 minutes after application. Protects and seals, indoors or out, without blistering or chipping—regardless of wear. *Downer, Hunnewell, Inc.*

10—Califilm is a thin, transparent film barrier that protects delicate instruments against extremely corrosive atmospheres. Film only four thousandths of an inch thick has a tensile strength of about 25,000 psi. It's tough and flexible, impervious to strongest acids, resistant to heat, moisture, and fungus growth. *W. S. Shamban & Co.*

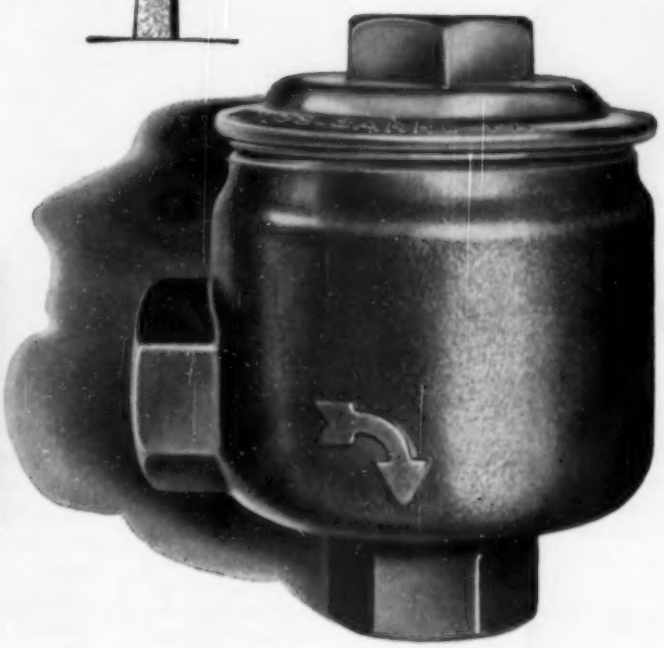
11—Cold Cleaners are fast drying, non-flammable, and non-toxic. Various types for different applications—for cleaning electrical equipment, small parts, process equipment, heavy machinery, gas and refrigeration systems. Performance and

TALK ABOUT

Capacity



Discharge orifice of 1" NICHOLSON trap (A) compared with other types of same size (B). Nicholson's greater—in every size!



Compare capacity of a Nicholson Steam Trap with any other trap of same size. Greater capacity—right across the board—means Nicholson Industrial Traps discharge condensate and air from steam lines and process equipment *faster*, more *effectively*. In toughest plant service, Nicholson's pay off 4 ways:

- **lower initial cost—more for the money**
- **less upkeep expense—minor maintenance**
- **faster warmup—high, even temperatures**
- **faster production—increased 20% to 30%**

Where performance counts, specify Nicholson. Write for *Catalog 953*.

NICHOLSON

W. H. NICHOLSON and Company

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FERGUSON
CONVEYORS

You will end congestion at machines, in the aisles, at shipping and receiving platforms and get better work flow when you put FERGUSON CONVEYORS to work. That has been the experience of plant after plant in many different industries because these conveyors:

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- move material more directly
- coordinate in-plant and out-plant handling
- ease the work load
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You'll soon get a big return on your investment when you put FERGUSON gravity and power conveyors in your plant layout. Write, wire or call for further details.

HARRY J. Ferguson COMPANY

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FACTORY / EQUIPMENT NEWS
Begins on page 247

For more about these products, circle item numbers on Reader Service card next to back cover.

property chart gives all the details. *Manufacturers Processing Co.*

12—"Boost" is a water-white volatile cleaning solvent that is fast-drying, non-toxic, and will not burn. Imparts fire-extinguishing qualities to lower-cost solvents. Said to be of special interest to electronic, radio, and metal fabricating industries—as a replacement for toxic carbon tetrachloride. *Curran Ordnance Chemical Laboratory.*

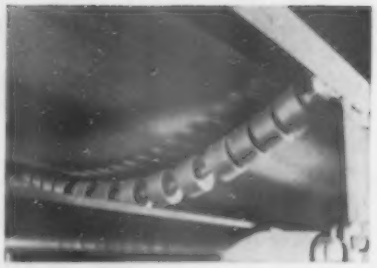
13—Hypercut XX is a concentrated water-soluble cutting coolant fortified with a super lubricant-additive called Hyperoil. For all metalworking applications. Permits higher-speed machining and machining of harder alloys, as well as prolonged tool life. *Destiny Products Co.*

14—Welding Additive eliminates need for many specialized alloy rods now required for hardfacing metals. "W. C. Basic" is a mixture of alloying elements and flux. Applies by any gas or arc welding technique. Permits wider use of inexpensive welding rods. *Western Carbide Corp.*

15—Gasketing Material provides a tight seal where harmful liquids are encountered. UL approved. Garlock 662 is a cork-base paper impregnated with "Chemigum" latex. Makes it water-, oil-, and gasoline-resistant. Enables gasketing to be used at temperatures as high as 300 F. *Garlock Packing Co.*

16—Polyvinyl Chloride sheets are now in larger sizes—up to 44-in. wide and 144-in. long. Unplasticized structural PVC (F-92) comes in thicknesses from 1/16 in. to ⅜ in. For food and chemical processing industries as well as for electroplating. *Kaykor Industries, Inc.*

17—High-Temperature Coating for steel will withstand temperatures up to 1000 F. Leader-Kote LIW-6731S is a silicon protective coating that will not flake off or develop bubbles under extreme conditions. *Leader Iron Works, Inc.*



NEW CONVEYOR BELT IDLER

Handles sticky, abrasive, dusty, or corrosive materials.
Has only two bearings—up out of the dirt.

A 2-bearing, cable suspension idler that resists dust, abrasion, corrosion and material buildup is proving itself superior for bulk handling in many industries.

Called the Limberoller, it has already given *10 times* the service life of replaced steel idlers in handling abrasive foundry sands, coal, petroleum coke, potash, copper ores, copper mill tailings, iron ore, wet concrete, triple super phosphate, ammonium sulphate, and sticky fertilizers.

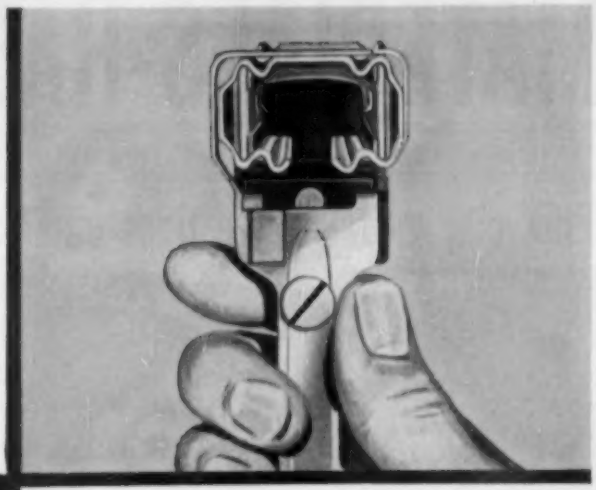
Pressure-molded neoprene or rubber discs on a flexible steel cable conform to load and cushion the belt, help keep belt aligned, and are self-cleaning. The two bearings are up out of the dirt zone; have had no design failures.

Unaffected by most corrosives that damage steel, the new idler is ideal for chemical, sulphur and salt plants; corrosive and high ozone atmospheres. It is more abrasive-resistant than steel and flexes out of the way of abrasive materials.

The Limberoller weighs 2/3 less than a conventional steel idler; is locked by a simple cotter key into special lightweight stands for easy installation and removal. No cover sheets are needed. Two types of stands are available: one that bolts to conventional rigid sections; and a self-supporting type that forms its own easily-erected, portable sections without bolts, by using special stiffening rails.

Because of these unique features, many companies have adopted Limberollers as standard for all belt conveyor operations. Details from *Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. Request Bulletin 24-12.*

TWISTOUT PLUGS engage bus bars with but a simple twist . . . make adding a light safe, easy, fast! Trolleys are also available to give real mobility to small power tools.



BULLDOG UNIVERSAL
TROL-E-DUCT

Puts Light Just a Twist Away . . .

Both feeds and supports lights along its entire length!

Imagine a *flexible* power source for lights and small power tools . . . and the savings it provides in increased efficiency! BullDog Universal Trol-E-Duct®—the *original*, continuous-outlet system—insures just such versatility . . . meets constantly changing needs for years to come. And it's a system as safe as it is efficient.

Twistout Plugs give positive, safe connections in seconds, anywhere along the duct. You may rearrange, add or remove lights without rewiring or downtime. Movable weight supports make it easy to hang lighting fixtures, to shift them anywhere on the duct.

You'll also find Universal Trol-E-Duct offers impressive savings over ordinary systems—in longer life, in maintenance, in many ways. Check your qualified contractor or BullDog field engineer, or write to BullDog Electric Products Company, Detroit 32, Michigan.

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IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S **BULLDOG**

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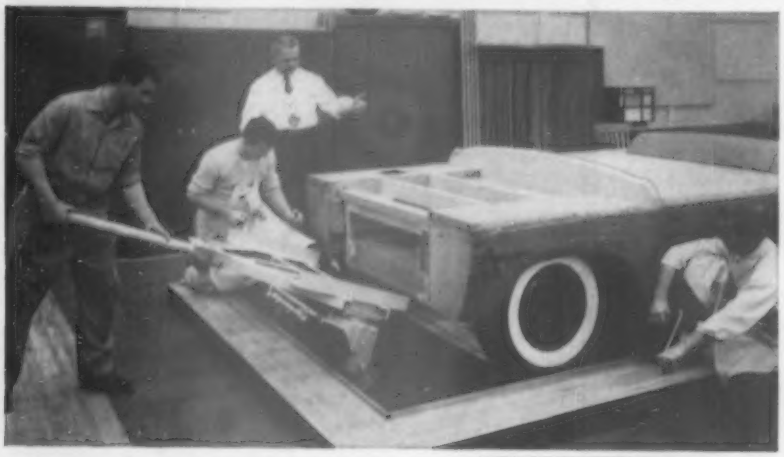
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

195X clay model Dodge rides on Floating-Hubs



Here's where Dodge brass get their first look at their future entries in the auto sales derby. Foundation for full-scale clay model *(above)* is wheeled into the Dodge styling studios on special dolly equipped with shock-absorbing Bassick Floating-Hub Casters.

Reason for Floating-Hubs

Job of handling these five-ton clay models easily yet carefully goes to dual-wheel Bassick Floating-Hubs for good reason. Their built-in snubbing action—with spring-controlled wheels offset from axles—absorbs shocks and vibration which could damage the models.

Plaster cast can't stop him!

Newest (and happiest) use for Bassick casters we've come across lately is this mobile cart used by 4-year-old Glen Breither.

Pinned in a chest-to-knee plaster cast by a rare hip ailment that takes years to cure, this Bridgeport boy goes places with a smile on the caster-sled his father invented. Bridgeport's Crippled Children's Workshop is now building the same kind of vehicle for other children.

State occasion for casters

Cast iron gate of the Old State Capitol in Baton Rouge, La., rolls open on as ancient a caster (not Bassick, by the way) as you're likely to find in this country.

Photo comes from industrial distributor Dixie Mill Supply Company. Your industrial distributor can check you out on new production methods, latest product improvements, new ways Bassick casters can help you move materials quickly and efficiently.

Caster load capacity

Type of tread, motive power (hand or machine), floor conditions, distance and speed of travel all affect the load a caster will carry satisfactorily.

Floor conditions, for example, are vitally important. On smooth concrete floors, loads roll twice as easily as on rough or littered floors.

Load capacities given in Bassick catalogs are based on average operating conditions. They're sound, conservative estimates of what the caster will carry through long years of service.

New "brain" fast on feet

IBM's experimental all-transistor calculator features a computing unit that takes half the space—requires only 5% of the power—of a comparable vacuum tube unit.

In keeping with this more efficient headwork is the new electronic brain's footwork. Those are Bassick casters on both the high-speed punching and transistorized calculating units. Couldn't have been a better choice if the brain had picked its own casters.

Casters cut manufacturing costs

Analysts of manufacturing costs have come up with two facts that can save you money! *First:* materials-handling generally runs about 30% of total manufacturing costs. *Second:* materials-handling is the one cost item easiest to reduce.

Bassick casters—like the precision MilSpec casters above—help you cut into the *reducible 30%*. Casters on equipment provide flexibility of economical movement—in *any* direction—immediately. They save wear on floors and dollies.

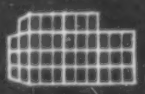
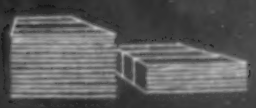
THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE

more Wirebounds used in 1955 than any previous year!

BECAUSE WIREBOUND BOXES AND CRATES

STACK BETTER  STORE BETTER 

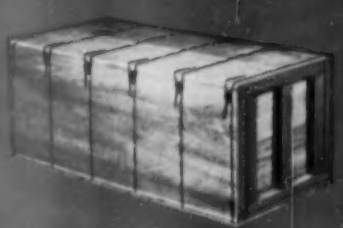
AND HANDLE BETTER INSIDE OR OUT

IN ANY KIND OF WEATHER NOTHING

TOO BIG ...NOTHING TOO HEAVY

NOTHING

TOO DIFFICULT, ALL AT A LOWER TOTAL COST!



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  - ☐ Packing and Handling Heavy Loads

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Fittings and hose designed for quick make-up by hand without tools. Excellent for automotive and industrial lines carrying water, hot oil, gasoline, diesel fuels, anti-freeze, L-P Gas, vacuum gage and air applications. Double fabric braid. Impregnated fabric cover. Working pressures to 250 psi. At your dealer.

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FACTORY | NEW BOOKS

Data Processing by Electronics—With the development of electronic data-processing systems, a new and valuable tool has been added to plant management's bag of tricks. The authors felt that much already had been written on the subject for the highly technical reader, and that plenty of information was available to the general reader on the broad implications of the subject. So they have attempted in this little book to follow a middle road—to give the interested reader who is not a specialist in the subject a basic understanding of the operation and use of electronic data-processing systems. It's our guess that many members of plant management are in this "middle road" boat, will therefore find this book useful. Beginning with a comparison of various methods for data processing—manual operation, key-driven operation, punched-card system, and finally, electronic systems—the book goes on to describe the scope of electronic data processing, fundamentals of programing, preparing for the electronic system, basic theory, systems components, and techniques. Finally, the appendix gives the operating characteristics and costs of equipment. *Haskins & Sells, 67 Broad St., New York 4. 113 pages. Free.*

Principles of Industrial Waste Treatment—This new book deals with the sources, pollutional effects, and methods for the treatment and disposal of liquid wastes produced by industry.

Setting the stage by discussing the effects of wastes on streams and sewerage systems, and the criteria developed by sanitary engineers for evaluating pollution, the author devotes most of his pages to the operations and processes used to treat industrial wastes before their discharge into natural waters or municipal sewers. In the three chapters on physical treatment, the author analyzes sedimentation, filtration, and heat-transfer operations. The four chapters on chemical treatment consider pH adjustment, oxidation and reduction, coagulation and chemical reaction, and adsorption and ion exchange. Disposal programs and problems of various industries are also discussed.

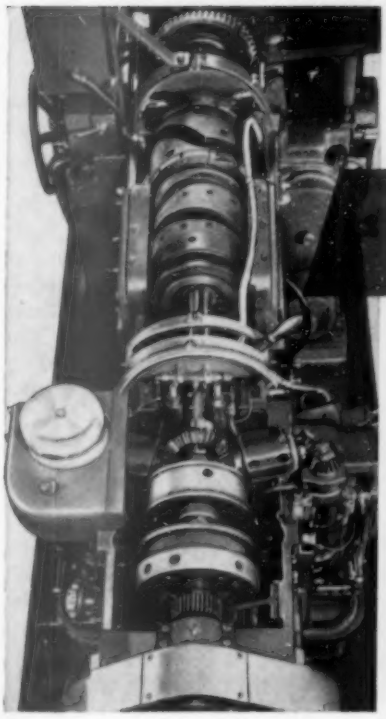
With emphasis on doing something about the waste problem increasing steadily, this book should be of value to many plant operating men. *By C. Fred Gurnham, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 399 pages. $9.50.*

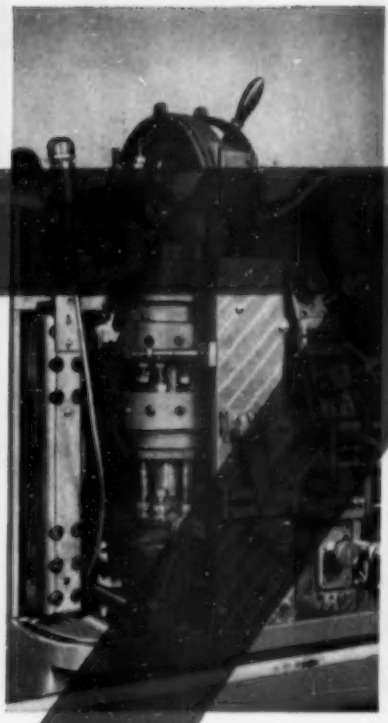
Handbook of Industrial Engineering and Management—A sourcebook of information on a wide variety of subjects, this new handbook should prove a useful reference for operating men. Chapters on organization, managing manpower, time and motion study, systems and procedures, materials handling, standardization, tool engineering and design, safety, hygiene, statistics, inspection and quality control, operations research, budgeting, labor relations, other subjects within the industrial engineering field. *Edited by W. Grant Ireson and Eugene L. Grant. Prentice-Hall, Inc., Englewood Cliffs, N. J. 1203 pages. $16.*

Design of Heating and Ventilating Systems—Feature of this book is a series of 96 charts designed to help you avoid much of the complicated mathematics normally involved in system design. They should be helpful in simplifying many design problems and conserving time of the engineer. The charts are, of course, graphical solutions of the important formulas involved in system design. Each graph can be read with an accuracy at least as great as that of the equation from which it is constructed. Considerable space is devoted to the new problems of panel heating and solar heating. *By F. W. Hutchinson. The Industrial Press, 93 Worth St, New York 13. 320 pages. $7.*

BOOKLETS

Engineering Standards, Multiple V-Belt Drives—This revision of the first standard (published in 1951) takes into account the improvements





Seven Fast Changeover Models

With the prospects of improved tool materials ever decreasing the actual machining time of work on Multiple Spindle Automatics, long runs tend to become short runs. Facility that decreases the time for job changes becomes more important to low-cost production.

Conomatics are available in as many as seven fast changeover models. These are the 9/16", 1", 1⅝" Sixes, and the 2⅝", 3½", 5", and 5¼" Fours.

These models are equipped with dial adjustment of working stroke of all slides, without making necessary change of total stroke or positive stop settings. Write, wire, or phone for literature descriptive of these features and other facilities available to users, or prospective users.

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

Ruggedly Safe

—to do any jacking job better!

SIMPLEX

JACKS

Re-Mo-Trol HYDRAULIC PULLERS

(PUMPS AND REMOTE CONTROLLED RAMS)
10 to 100 ton capacities

**UNIQUE "CENTER-HOLE"* ** minimizes rigging and set-up—provides more effective power.

Simplifies tough pulling jobs! Pull rod or screw is drawn *through* ram plunger in straight, torque-free pull. Ram is own backup. Also lifts or presses.

*"Center-Hole" in rams of 30 ton and greater capacities.

RATCHET LOWERING JACKS

Lift or lower the load notch by notch. Cannot be tripped. *Toe* has *same capacity* as cap! High lift with minimum clearance means less set-up, less blocking. Single or double acting. 1½ to 20 ton capacities.

HYDRAULIC JACKS

Fast, easy power! Operate vertically or horizontally with same efficiency. Tested to 50% over rated capacity. Single or double pump models; 3 to 100 ton capacities.

SCREW JACKS

Cap floating on single chrome-moly ball reduces friction 88%. Forged cap corrugated for safety. Malleable iron base flared for stability. Four-way or ratchet heads. 10 to 24 ton capacities.

Other SIMPLEX JACKS include:

Simplex-Jenny Hydraulic Pullers
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Trench Braces
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WRITE FOR GENERAL CATALOG No. 53

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

TEMPLETON, KENLY & CO. 2517 GARDNER ROAD, BROADVIEW, ILLINOIS

Begins on page 256

in V-belts, which have resulted in greater belt strength and higher horsepower ratings. Data includes the sheaves and belts that should be used to obtain optimum efficiency and economy for any service application. Changes in the new manual include 10 pages of new horsepower ratings for belt speeds from 200 to 6000 feet per minute. The basic horsepower formulas used in obtaining the new ratings are also shown. *Multiple V-Belt Drive & Mechanical Power Transmission Assn, 27 E. Monroe St., Chicago 3. 24 pages. $1.*

Budgeting for Profit—Especially designed for the operators of small and medium-sized businesses who have not as yet established a cost accounting system. Covers budget preparation and planning, follow-up and evaluation through budget reports, budget adjustment to meet changing conditions. *By William E. Thomas. Bureau of Business Management, University of Illinois, Urbana, Ill. 56 pages. $1.*

Factory Management and Maintenance is a consolidation of Factory and Industrial Management and Maintenance Engineering.

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: The Engineering Magazine; Industrial Management; Factory, the Magazine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following publications: Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.

In addition, features of the publication Timely Ideas have been added.

All rights in the above names are reserved by the publisher.

TURBO-BLOWER

in "perfect condition" after 40 months' service

AAF Multi-Duty—today's most widely used self-cleaning filter for supplying clean air for blast furnace operation and motor room ventilation.

MULTI-DUTY air filter collects 3600 wheelbarrow loads of dirt in protecting vital equipment

THE date—April 12, 1955. The place—a southern mill of one of the nation's major steel companies. The occasion—inspection by plant officials of turbo-blower serving blast furnace to determine condition of rotor after 40 months of uninterrupted service. The findings—rotor in "perfect condition" with no blade erosion, oil entrainment or visible dirt in evidence.

Reason for this outstanding service record—intake air for turbo-blower was cleaned by a 60,000 cfm AAF Multi-Duty Air Filter. It was a "king size" cleaning job, too—with an estimated wheelbarrow of dirt being collected every 8 hours or a total of 3600 loads over the 40 month period.

Constant efficiency and uniform air cleaning are assured, regardless of dust load, with the self-cleaning Multi-Duty. This air filter keeps itself "shipshape" automatically; works every shift every day; requires no attention other than periodic inspection and removal of sludge.

How can you verify these facts? Just ask your local AAF representative for a list of long-time, satisfied Multi-Duty users. It reads like the "Who's Who" of the steel industry.

AAF Dust Control Equipment

Illinois Steam Heating Specialties

American Air Filter
COMPANY, INC.
361 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

BETTER AIR IS OUR BUSINESS

Herman Nelson Unit Heaters

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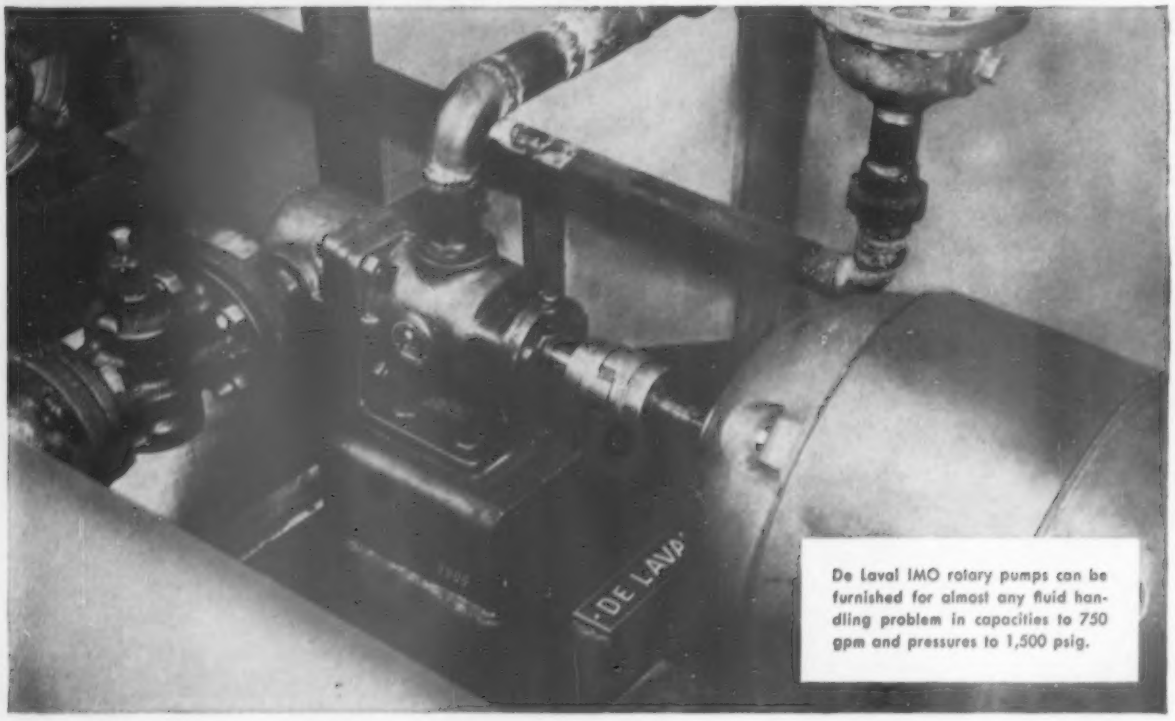


De Laval IMO rotary pumps can be furnished for almost any fluid handling problem in capacities to 750 gpm and pressures to 1,500 psig.

What to Look for in a Rotary Screw Type Pump

By W. J. MONCON, *Assistant Chief Engineer*
De Laval Steam Turbine Company

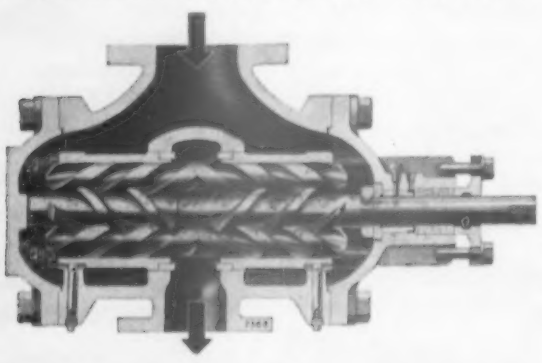
A sound knowledge of design, and how it affects performance, is the best insurance a buyer can have that he will get the pump he needs. This brief analysis of the IMO, a rotary three-screw pump manufactured by the De Laval Steam Turbine Company, will give you some of the necessary facts.

What qualities should you look for in a rotary type pump? It must, of course, meet specified capacities and pressures. But, it must also be efficient, operate quietly, stay on the job.

The axial flow of a screw type pump, and the resulting low inlet losses for any given pump speed, are important benefits that should be considered in making pump selections. The absence of timing gears and other mechanical features of construction also enable the De Laval IMO pump to operate at direct-connected motor and turbine speeds . . . to handle viscous liquids and high suction lifts.

One of the most important features of the IMO pump is the hydraulic turning of the idler or sealing rotors. The central or power rotor is the pumping element; the liquid pumped turns the sealing rotors.

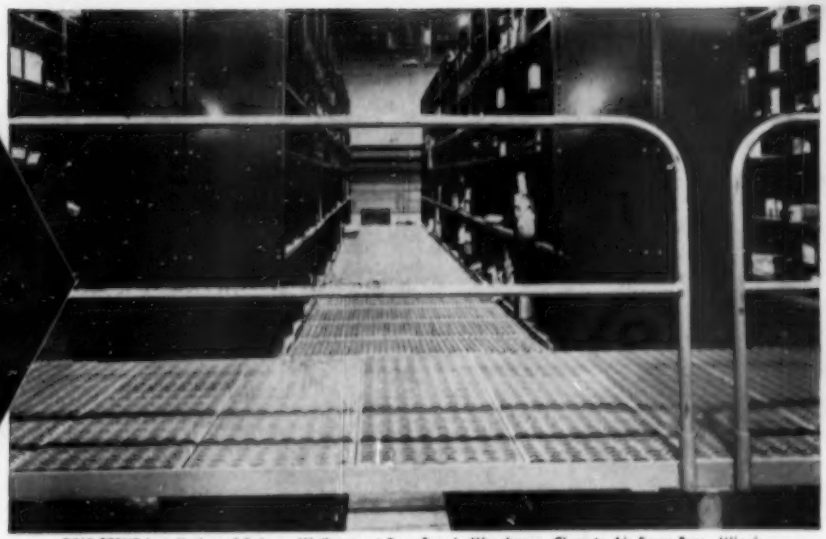
A screw type pump is well suited for applications where pulsation-free flow is desirable. The axial flow of the liquid without trapping and the unique thread form which keeps closures fluid-tight contribute to quiet operation of the IMO pump.



De Laval IMO Series A322A, a positive displacement, rotary screw type pump, can handle capacities to 750 gpm and pressures to 150 psig.

Catalog LS gives useful application and specification data on the IMO pump. An article titled, *Rotary Pumps, Basic Considerations in Their Application*, contains a description of rotary pumps in general. For these publications, write on your company letterhead to De Laval Steam Turbine Company, 804 Nottingham Way, Trenton 2, New Jersey. DL-201

USE THE FREE AIR ABOVE



GRIP-STRUT Installation of Balcony Walkways at Base Supply Warehouse, Chanute Air Force Base, Illinois

TO ENLARGE YOUR PLANT AND STORAGE AREAS WITH...

Balcony of GRIP-STRUT used to store body patterns, Body Div. Pontiac Motor Car Co., Pontiac, Mich.

Another view showing GRIP-STRUT balcony walkways and stairs at Chanute Air Force Base, Illinois

EASY-TO-ERECT ECONOMICAL

GRIP-STRUT BALCONIES

Now you don't have to extend walls to get more plant or storage room. Just use the air above your present areas to get more space with GRIP-STRUT balconies.

BIG ECONOMY FEATURES: No extra light needed below—no extra heat. No additional supports necessary because channels are an integral part of the material. No secondary sprinkler heads needed. Self cleaning. GRIP-STRUT can be cut and installed like lumber by your own maintenance force. Extremely economical—low in original cost.

IMPORTANT SAFETY FEATURES: Fire proof, slip proof, maximum strength with minimum weight. Easy to stand on, cool in summer, warm in winter.

Safety GRIP-STRUT is the new, basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads. Write for new catalog today.

Distributors in all principal cities.
Consult yellow pages in phone book under "GRATING"

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The **GLOBE** *Company*

GRIP-STRUT DIVISION

MANUFACTURERS SINCE 1914

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COMPLETELY SEALED CASTERS

Another *first* for Albion casters! A completely sealed caster that stays sealed... completely eliminating the need for periodic maintenance due to grease loss, dirt, debris, water or other foreign matter.

Albion casters have been completely redesigned to incorporate precision *moulded* Synthi-Rubber ring gaskets around the load raceways and the wheel axle ends. In addition, a formed steel, leakproof retainer cup is press-fitted over the thrust raceway . . . thus, Albion's *completely sealed* casters outlast ordinary casters and save your equipment dollars.

HERE'S WHY . . . Albion caster engineers would not accept the so-called "sealed casters" available which employed flat rubber, felt or steel baffles as "seals". As a result, they designed and developed precision *moulded* Synthi-Rubber gaskets to guarantee a truly sealed caster to solve your caster problems.

Albion's new completely sealed casters are available in a broad range of popular sizes and wheel types to suit your needs.

ai

ALBION INDUSTRIES, INC.

ALBION, MICHIGAN

FACTORY | NEW FILMS

This is Automation is a documentary film that traces the evolution of automation from its inception in the early 19th century up to the present day—its history, growth, concept, applications, and future. It defines its subject as "continuous automatic production"—that is, a method of manufacturing that embraces the automatic making, inspecting, assembling, testing, and packaging of parts and products in one continuous flow. The film points up how utilization of automation principles raises productivity, expands capacity, and lowers operating costs. It's designed to show how middle- and small-size industries can improve their manufacturing operations by adoption of automation techniques. Beginning with the materials best adapted to a "flow" system (such as chemical and food industries), the film continues on to the so-called non-flowable products (such as cylinder blocks, condensers, refrigerator doors), showing how new methods now enable products in this last category to be manufactured according to automation principles. 16mm, color, sound, 30 min. Film is part of "More Power to America" kit that includes a 36-page bulletin entitled *Automation*. Available for loan from:

General Electric Co., Apparatus Sales Div., Schenectady 5, N.Y.

Metalworking is a series of six silent filmstrips correlated with John L. Feirer's book, *General Metals*. They provide step-by-step instruction on techniques in working with bench metal—cutting, filing, and drilling; sheet metal—laying out and cutting, forming and seaming; art metal—making trays and bowls. Demonstrates the proper equipment and materials for all these processes. Available for purchase ($5.50 per filmstrip, or $30 set) from:

Text-Film Dept., McGraw-Hill Book Co., 330 West 42nd St., New York 36.

Success Story describes the development and operation of the "Pneu-Draulic" operator for circuit breakers. Shows how this new system overcomes handicaps associated with previously used energy sources. Simplified diagrams of the hydraulic circuit explain the nine essential elements in the system and the valve positions during closing stroke and as the ram returns from closing stroke. 35mm filmstrip, sound and color, 15 min. Available from:

Allis-Chalmers Mfg. Co., Milwaukee 1, or any branch sales office.

MAINTENANCE

The following recent films will supplement the article on "Maintenance Performance," starting on p. 81.

Power Press Maintenance shows the correct procedure for setting up a new press and the proper methods of inspection and maintenance. Provides how-to tips on checking and adjustment of lubrication systems, ball joints, bearing clearances; and service instructions for rolling key and air friction clutches. Color, sound, 25 min. Available for free loan from:

E. W. Bliss Co., Advtg. Dept., 1375 Raff Rd. S.W., Canton, Ohio.

How to Install and Take Care of Power Pumps gives helpful information on power pumps to engineers and operating men engaged in oil and gas recovery, hydraulic press, and other operations. Partly covers installation: foundation, suction conditions, piping support, cleaning, alignment, lubrication, and testing. Part 2 is on maintenance: initial and replacement packing, packing adjustment, common types of pump valves, and tips on trouble-shooting common pump problems. Color, sound slidefilm, 23 min. Available on loan for group showings from:

Worthington Corp., Advtg. and Sales Promotion Dept., Harrison, N.J.

Productive Maintenance (see review of this film in FACTORY, September, 1954). 16mm, sound, color, 25 min. For loan, write:

General Electric Co., News Bureau, Schenectady 5, N.Y.

Letters cut from new Kaylo-20 dramatically demonstrate ease of on-the-job fabrication

New pink insulation boosts Kaylo temperature range 600°F.!

Kaylo®—king of high-temperature insulations—adds a new jewel to its crown . . . a complete line of *pink* Kaylo-*20* insulation serving the extremely high-temperature ranges from 1200°F. to 1800°F.! New Kaylo-*20* is designed for all extra-high temperature applications including catalytic cracking units, refractory wall backing for furnaces and boilers, and fireproofing of piping, equipment, and vessel skirts.

For the first time, Kaylo-*20* brings to these high-temperature installations all the qualities that made regular Kaylo famous—*stability* (Kaylo-*20* will not disintegrate even in boiling water) . . . *ease of application* (cut, saw or score it on the job with ordinary hand tools) . . . *light weight* (only 11 pounds per cubic foot) . . . *economy* (remove it for line inspection, replace it without waste). Kaylo-*20* shrinkage at top temperatures runs less than 2%!

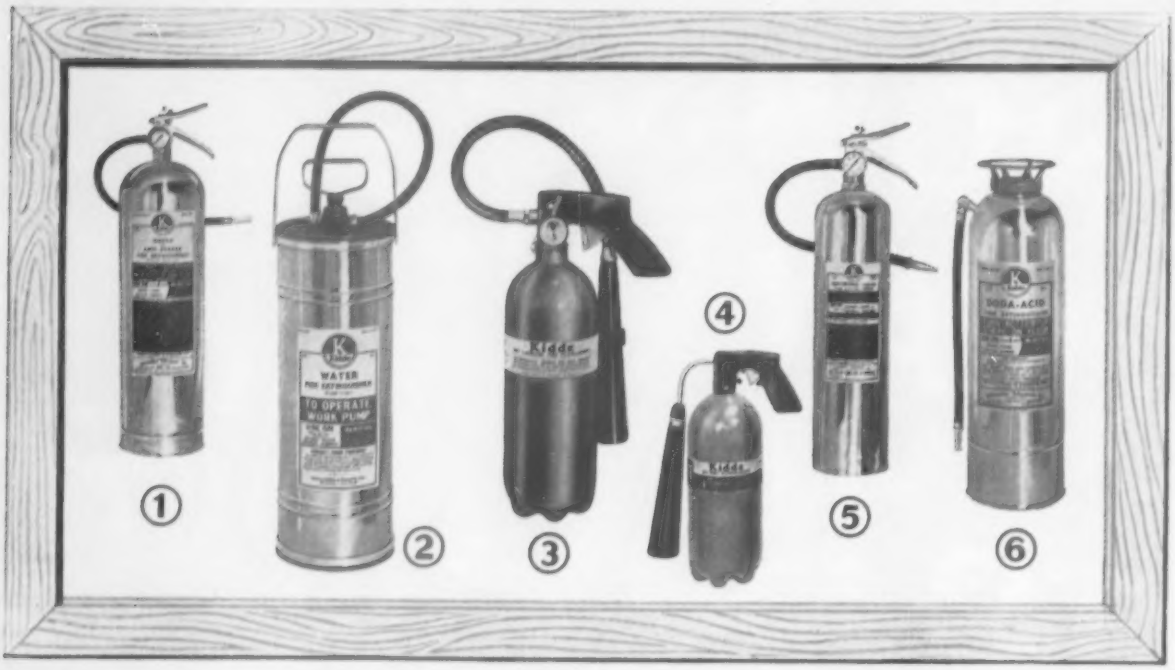
New Kaylo-*20*—now available in a complete range of thicknesses for iron pipe and copper tubing sizes from ⅛" to 39", and in blocks and beveled lags up to 18" x 36" x 3" thick—is distributed by Owens-Corning Fiberglas Corporation. With the other Fiberglas* industrial insulations, Kaylo-*20* completes the most versatile family of plant insulations available. See *Sweet's File*, *Chemical Engineering Catalog*, or *Refinery Catalog*. Or write: Owens-Corning Fiberglas Corporation, Dept. 35-A, Toledo 1, Ohio.

KAYLO and FIBERGLAS—from one reliable supplier—now provide complete insulation coverage from lowest sub-zero to 1800°F.

OWENS-CORNING
FIBERGLAS

*T.M. Reg. Owens-Corning Fiberglas Corporation
® T.M. Reg. Owens-Illinois Glass Co., Inc., mfr. of Kaylo

NOW! *Brand-New* Extinguishers Make Kidde Line *Most Complete!*



Efficient, dependable and superior in design, the new *expanded* line of Kidde extinguishers now makes it easier for you to choose the *right* extinguisher for every fire hazard!

1. Water and anti-freeze. Now available either air-pressurized or cartridge-operated, in either brass or stainless steel, 2½ gallon capacity.

2. Pump tanks. 2½ and 5-gallon sizes, in either galvanized or polished copper tank. Removable all-brass double-action pump throws 40-foot stream.

3. Dry chemical. Air-pressurized in 5 or 10-pound capacities, cartridge-operated in either 20 or 30-pound portables. 150-pound capacity wheeled unit for large hazards.

4. Carbon dioxide. Portables in 2½, 5, 10, 15 and 20-pound capacities, in either trigger or squeeze-valve models. Also wheeled units in single-cylinder capacities of 50, 75 and 100 pounds.

5. Vaporizing liquid. CTC or CBM, pump or air pressure operation with seamless drawn brass shell. Pump capacities 1 to 1½ quarts, pressurized capacities 1 and 1½ quart or 1 gallon.

6. Foam and soda-acid. Seamless drawn brass or stainless steel shell, in 2½ gallon size. Also available: 40-gallon soda-acid and foam wheeled units.

For more information on these and other extinguishers in Kidde's new expanded line, write today for the new Kidde P-8 catalog.

Walter Kidde & Company, Inc.
132 Main Street, Belleville 9, New Jersey
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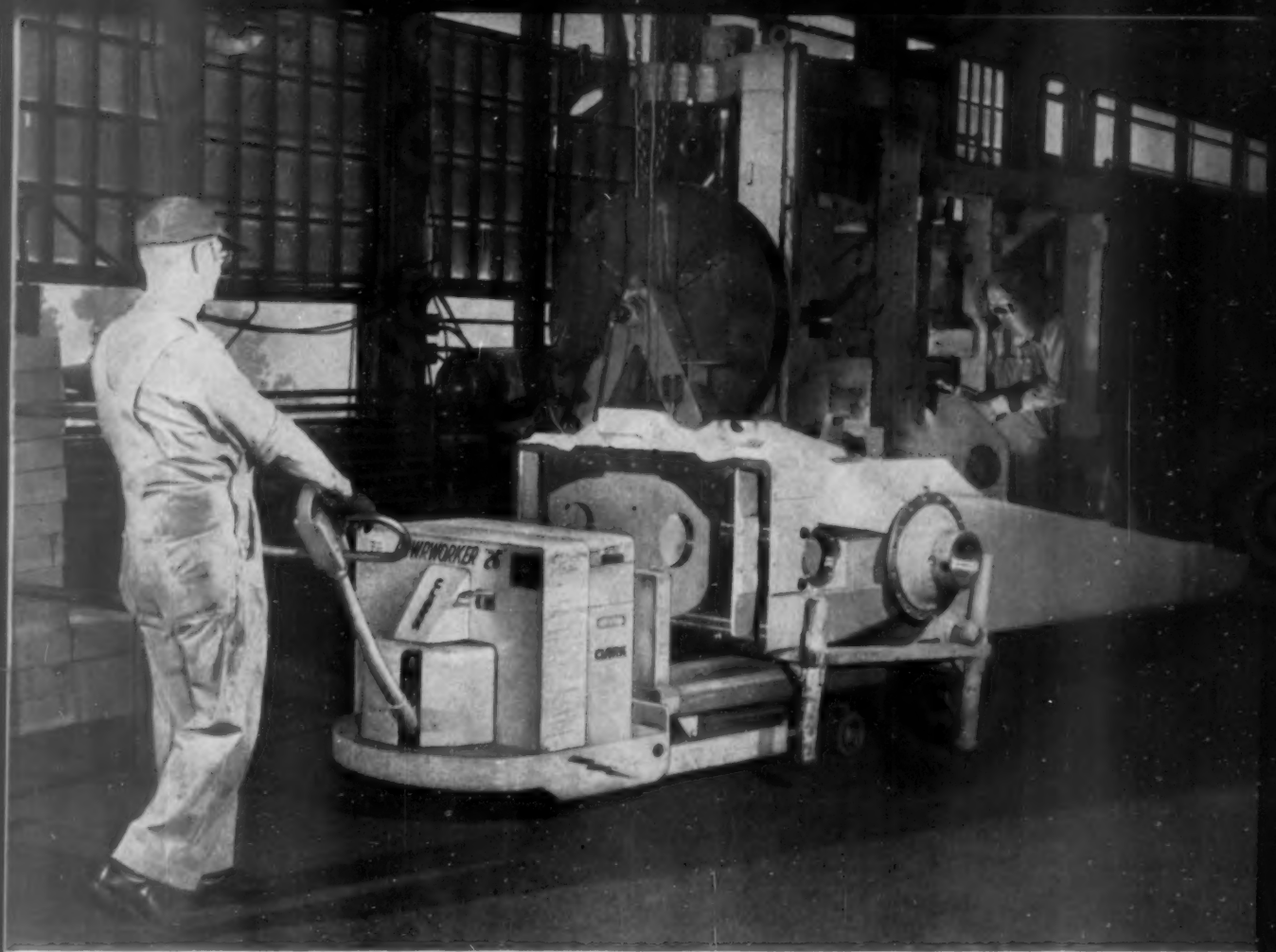

One reason Le Tourneau-Westinghouse specified Clark is the dependable local service offered by R. E. Common Equipment Co., Peoria. It's typical of *all* Clark dealers. It's smart business to do business—locally.

CLARK *POWRWORKER*®
at LE TOURNEAU-WESTINGHOUSE

"It takes more than features . . ."

Truck features are important. Fact is the Powrworker gives you more features than any other powered hand truck.

BUT PERFORMANCE DOESN'T *JUST* DEPEND ON FEATURES. How about a year from now, or two years, or five? That's when you depend on service—fast, local service.

And that's where your local Clark dealer comes in. Clark dealers have the largest supply of service parts in the industry—genuine Clark parts that are warranted and guaranteed for quality. He has factory trained men who *know* your machines. He provides prompt mobile service for emergencies, preventative maintenance right in your own plant, a completely equipped shop for rebuilding, and a fleet of rental trucks to help you over peak work loads. Here, is a *complete* service package.

SEE THE BONUS FEATURES of the Powrworker. Send for your copy of the new 16 page Powrworker booklet showing full details, cut-away views, reasons why the Powrworker will outperform any competitive machine on the market.

CLARK® EQUIPMENT

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POWRWORKER SECTION, Industrial Truck Division
CLARK EQUIPMENT COMPANY
BATTLE CREEK 12, MICHIGAN

IF YOU'RE 20% RIGHT

YOU'RE 100% RIGHT

All paint jobs are divided into two parts . . . the *materials part*, which represents not over 20% of your total costs, and the *labor part*, which represents a big, fat 80% or more. And the first part can affect the second part tremendously.

That is why experienced paint buyers in leading industrial plants the country over insist on *Barreled Sunlight* . . . even though Barreled Sunlight might cost a few pennies more per gallon.

They know, *from experience*, that Barreled Sunlight Super Hiding* maintenance paints take up to a full gallon of thinner to the five-gallon bucket . . . a not-to-be-overlooked factor that cuts materials costs appreciably. And, what is even more important, they also know *from experience* that Barreled Sunlight's extra yardage, solid covering and ease of brushing also cut all-important *labor* costs with which every industrial executive is all too familiar.

So, on YOUR next paint job, why not be 100% right? Use the paint that cuts labor costs as well as material costs. Get the job off on the right foot with *Barreled Sunlight* and you'll end up with both feet on the ground, costwise and performancewise.

Write for free copy of the Barreled Sunlight "Engineered Color" catalog and name of your nearest Barreled Sunlight representative. Barreled Sunlight Paint Co., 2-A Dudley St., Providence 1, R. I.

Barreled Sunlight® Paints

*Reg. U. S. Pat. Off.

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

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Prove for yourself how a Mobilift® "Sit-Down" or "Stand-Up" Fork Lift Truck can help you cut costs *at once* – by substantially lowering operating and maintenance expenses . . . reducing man-hours per job to a bare minimum.

Only Mobilift Trucks give you high free lift at no extra cost . . . smooth Mobil-Matic* drive . . . fingertip controls for easier operation, and many other exclusive features.

Mobilift "Sit-Down" and "Stand-Up" Trucks operate on LPG or regular gas, and range from 2000 to 5000 lbs. capacities. Mobilift Sales and Service is available in 75 cities throughout the U. S. and Canada.

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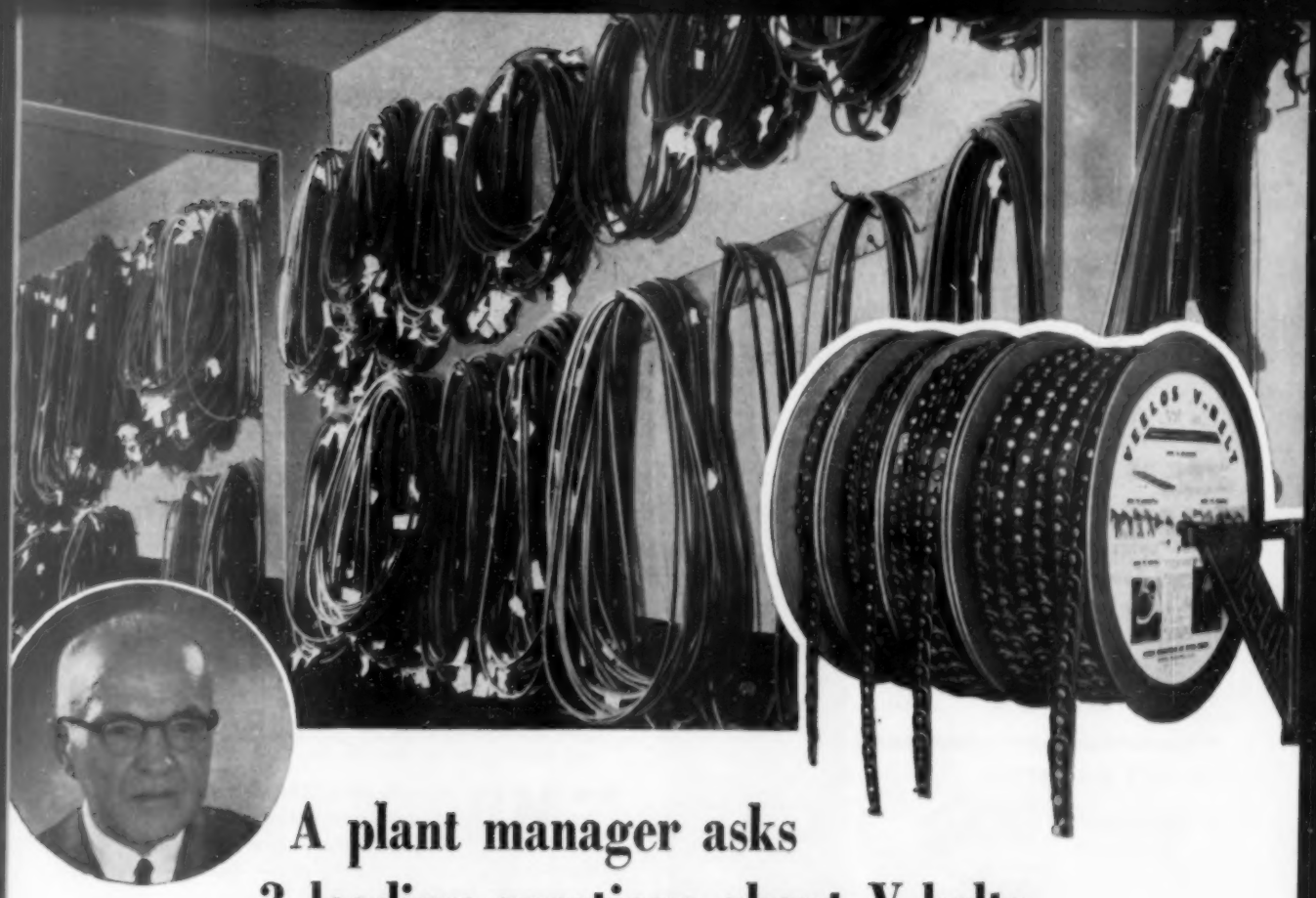

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With *four* 100′ reels of Veelos (O, A, B, C widths) you can replace as many as 316 different sizes of endless belts —and store your Veelos in *inches of space!* Veelos cuts your inventory to a minimum. No obsolescence or deterioration, no worries about specific sizes. With Veelos, your storage and inventory problems are licked!

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The complete Chicago "Safety Plus" line includes in alloy steel: Socket Set Screws • Socket Head Cap Screws • Socket Stripper Bolts • Square Head Dog Point Set Screws • Socket Pipe Plugs • Flat Head Socket Cap Screws • Dowel Pins • Hexagon Keys and Key Kits • Also Socket Set Screws and Socket Head Cap Screws in Stainless.

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If you can use shears you can CONTROL VIBRATION

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A pair of shears and a standard package of Isomode Pads . . . that's all you need to isolate troublesome shock and vibration on some 80 tons of machinery.

Made of durable, resilient DuPont neoprene, these ribbed pads support up to 50 lbs. per sq. in.—do an effective job of muffling plant noise and reducing maintenance costs on machines and buildings.

Installation is utter simplicity—simply cut to fit machine feet and install. No waste, no fuss, minimum down time. Write for prices and Application Bulletin No. 415.

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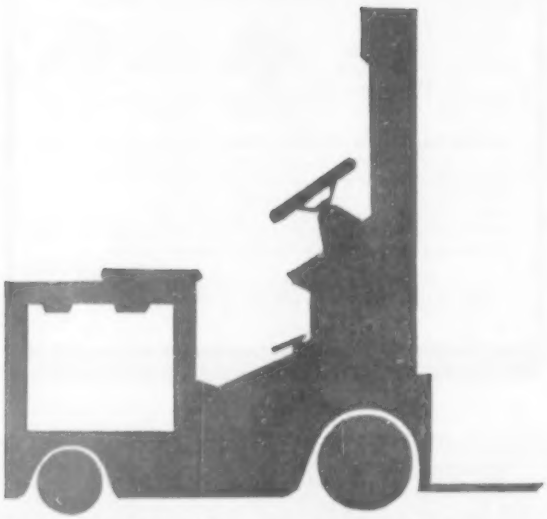
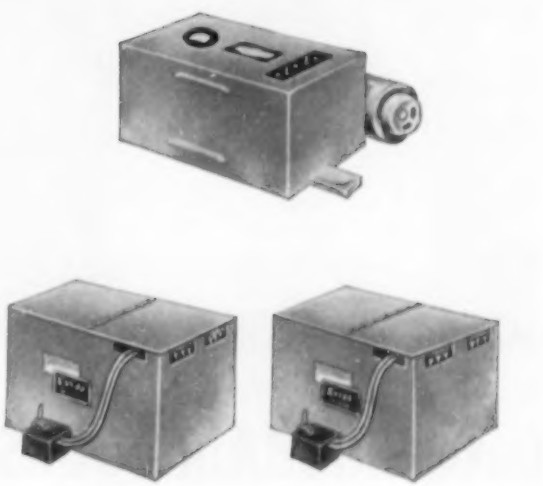
NOW! Initial cost of electric industrial trucks cut drastically by unique new Exide® Plan





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To reduce the initial cost of a complete electric-truck work package (truck chassis, batteries, charger), and to prove that you can operate Exide-powered electric trucks at substantially lower costs than trucks powered by other means, Exide offers this unique, money-saving plan:

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Exide Industrial Division
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Tileston and Hollingsworth Company, one of New England's oldest and most famous papermakers, wrote us a letter, saying in part—

"The doors were installed in our Machine Room, where traffic moves twenty-four hours a day, six days a week. Trucks are continually smashing into the doors, as rolls are moved from the paper machines into the finishing area. The doors have given almost trouble-free operation since installation. The Rubbair Door operates faster than any other we have used."

Rubbair Doors speed handling, reduce repairs, protect loads wherever doors must be hung in an industrial operation.

Check these advantages:

- **Improved insulation**
- **Reduced noise, industrial fatigue, injuries to personnel**
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- **Speedier handling of materials**
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ACCESSORY EQUIPMENT (All Interchangeable):

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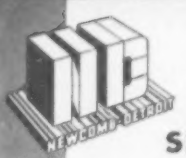

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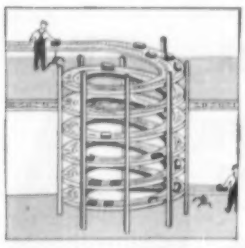
Want an IDEA?

to help solve a handling problem? Rapistan ideas are different — and save you money, time, space and effort!

Time after time, Rapistan men have solved materials handling problems which seemed to have no solution. And they've been able to cut costs for many customers by detecting trouble spots, and suggesting a remedy. These are typical of the Rapistan ideas which have solved problems for all types of industries. . . .



A stack-up saved jam-ups

The problem was to provide in-process storage for quantities of a product released from baking ovens at one time, but processed at a regular rate.

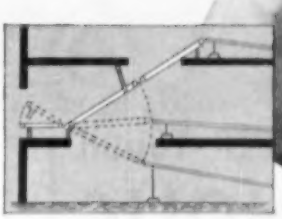
The solution was a two-story spiral accumulator of wheel conveyor. The result is smooth production flow, and a saving of $30,000 in construction cost.

Go signal for stop & go assembly line

The problem was to provide a steady flow of work on a progressive assembly line with slightly different time requirements at each work station.

The solution was gravity wheel accumulators connecting work stations to provide a backlog of work-in-process.

The result is a smooth flow of assemblies without work stoppage, and the elimination of costly handling between stations.



Pinch-hitting conveyor saves space

The problem was to provide access to three floors from a receiving dock where space limitations made conventional equipment impractical.

The solution was a Floorveyor with a special bearing equipped pivot boot and a 1000 lb. electrical hoist.

The result is a power belt conveyor that can be raised or lowered to meet conveyor lines located in basement and on first and second floor.

Rapistan ideas come from the combined experience of more than 200 field men, who work with the most progressive engineering department in the business. Rapistan men face new problems every day . . . meet many which are new only to the customer. Similar problems, already solved by Rapistan for other customers, often make the solution simple and speedy. You owe it to yourself to call on Rapistan for materials handling ideas that can save you money, time and effort, too!

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There's a Rapistan man in your area . . . or write us direct about your problem.

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- GRAVITY CONVEYORS
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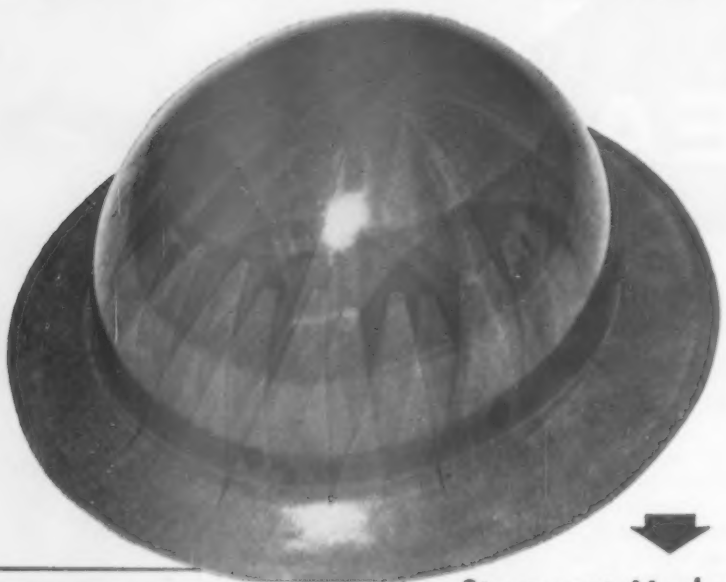
LOOK TO WILLSON
for another new development in head protection!



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SAFETY HATS AND CAPS

FROM THE WILLSON RESEARCH CENTER now comes the "Phenolic" line of scientifically designed safety headgear that meets all specifications with ease!

In this Super-Tough line are safety developments so outstanding that you'll find it offers unequalled value. For instance, the famed "geodetic suspension" and the unique pneumatic headband are obtainable in both adjustable *lace-in* and *snap-in* types of hats and caps.

Ask your Willson distributor to demonstrate the heavy duty Phenolic line that combines comfort and maximum head protection. Or write for latest "Super-Tough" bulletin describing them in detail.

Strongest Made!

See how it's built up from 24 individual die cut pieces into a sturdy Phenolic pattern that withstands repeated 80-foot-pound drop ball tests without even fracturing!

LACE-IN SUSPENSION

Both hats and caps are available with convenient lace-in suspension feature. Easily adjusted for snug comfort to any head size.

SNAP-IN SUSPENSION

Handy Center-Tie snap-in type suspension is also obtainable in Super-Tough hats and caps. *Willson's exclusive patented "Geodetic Suspension" and Pneumatic Headband can be had in any style!*

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KWIK-COLOR SEAL: A superior concrete beautifier and preserver made from an emulsified plastic resin. Odorless, non-inflammable, water resistant, easy to apply. Dries in 20 to 30 minutes. Busy floors are back in service within 2 hours after etching, sealing and waxing. Available in Tile Red or Light Gray *permanent*, non-fading colors. KWIK-COLOR SEAL covers approximately 800 sq. ft. per gal.

KWIK-COLOR WAX: High gloss, waterproof emulsion WAX for use over KWIK-COLOR SEAL to protect the seal during 14 to 20 day curing period. Highly water resistant, easy to apply. Dries in 20 to 30 minutes. Available in *permanent*, non-fading Tile Red or Light Gray colors. KWIK-COLOR WAX covers approximately 1000 sq. ft. per gal.

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FEATURES

- Moisture and Fungus Resistant
- Excellent Heat Dissipation
- Dimensionally Stable
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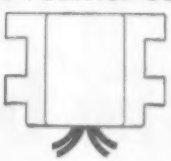
- Non-combustible

Furnas Electric again leads the field—this time with magnetic controls with Dual Seal coils for longer control life. Dual Seal molded coils are moisture and fungus resistant, dimensionally stable, age resistant, will not support combustion and have high dielectric strength. Their mechanical properties eliminate the damage often caused by vibration or impact.

DUAL VOLTAGE COILS



Coil changing is virtually eliminated and stocking of coils simplified with the new Dual Seal dual voltage coils. For example, on 3, 7½ or 10 hp. starters, one 220-440 volt Furnas Electric coil is used where six are normally required.

Write today for free 140-page Catalog 101. Furnas Electric Company, 1032 McKee Street, Batavia, Illinois.

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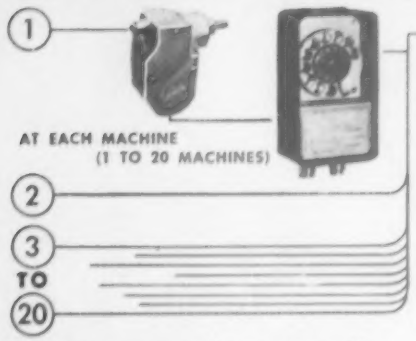

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RECORDS PRODUCTION . . .
RECORDS "DOWN TIME"
AND RECORDS
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Why were your machines stopped?
How long did this unproductive "down time" last?
What hours and how much of the day does each machine produce?
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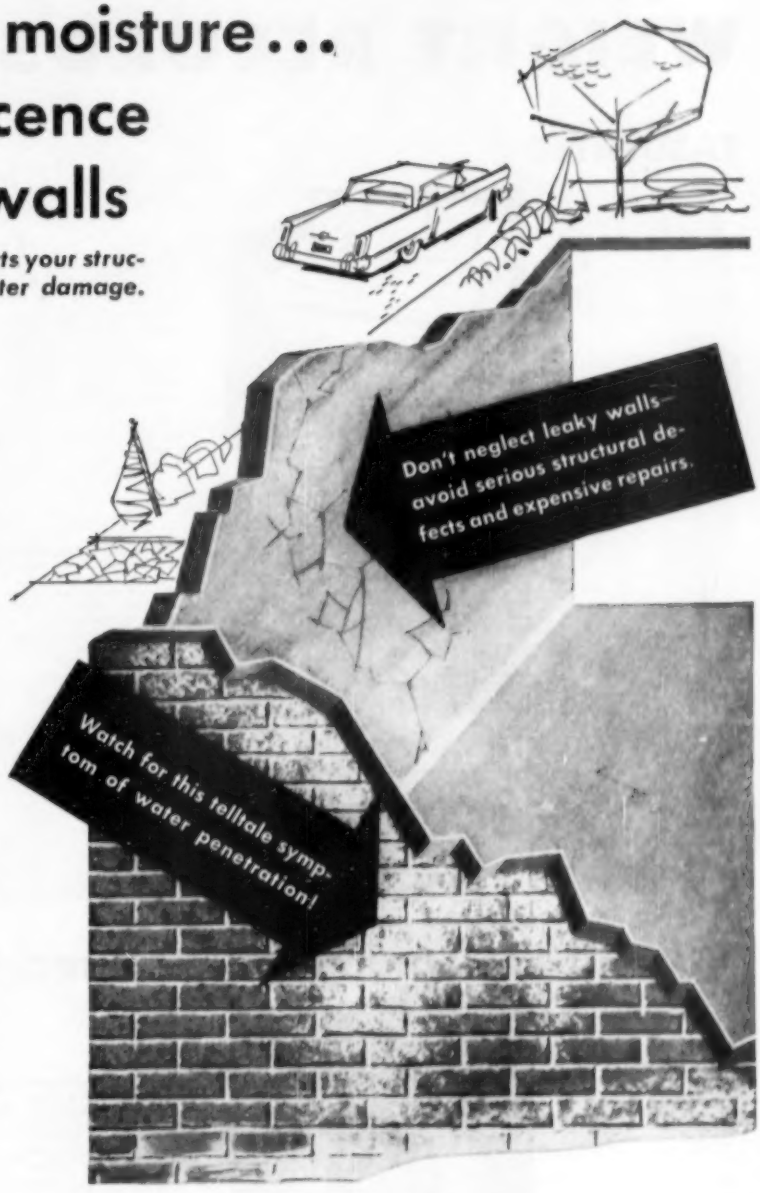
DEHYDRATINE NO. 22

seals out moisture... stops efflorescence on masonry walls

Silicone base water repellent protects your structures from inside and outside water damage.


Don't neglect leaky walls—avoid serious structural defects and expensive repairs.
Watch for this telltale symptom of water penetration!

Dehydratine No. 22 is no ordinary "surface" repellent. It functions on the principle of "negative capillarity" *in depth*. The highly penetrating characteristics of Dehydratine No. 22 set up a valve-like action within the masonry that permits vapor to escape *outward*, but stops the capillary absorption of solid drops of moisture from passing inward.

Dehydratine No. 22 reduces soiling and discoloration

Dirt and soluble stains cannot enter the pores of masonry treated with Dehydratine No. 22. Thus foreign particles trapped on the surface are readily washed off by rain. Owners and operators of concrete or light-colored stone buildings find that this saves money by eliminating difficult and expensive cleaning operations. Since Dehydratine No. 22 is effective against "white bloom" or efflorescence, it preserves the original beauty of the exterior without changing the color or texture of the surface. It pays to protect your structures against *inside* and *outside* water damage with Dehydratine No. 22.

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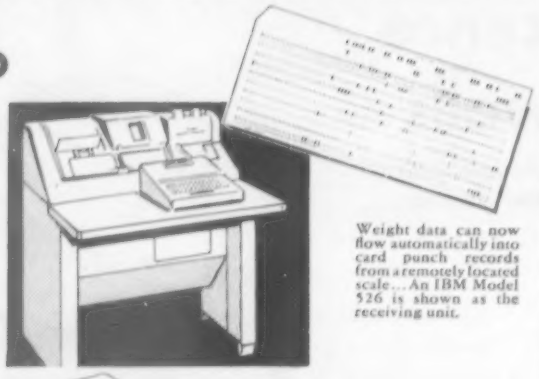
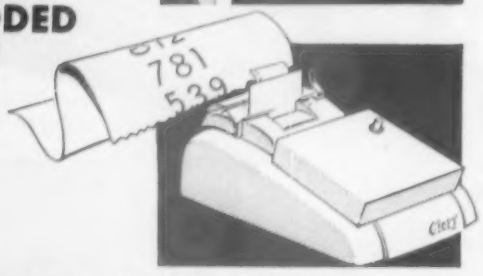
New REMOTE WEIGHT RECORDS

TABULATED



Weight data can now flow automatically into card punch records from a remotely located scale... An IBM Model 526 is shown as the receiving unit.

ADDED



Weight records can be transmitted to an adding machine and printed on the tape and inserted tickets with ability to totalize weight on the tape. Clary Model 9310 shown.

DIGITAL INDICATION

A completely new concept of weight indication! From a remotely located scale, illuminated digital weight-indication is obtained.

by TOLEDO ELECTRONIC WEIGHT CONTROL

The weight indication passes through a Toledo digital scanner and electronic counter and translator to provide an accurate signal that operates these remote devices to bring weights anywhere in the form most useful to you.

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What is your weight control problem? Write for bulletins on new Toledo remote digital-indication and recording.

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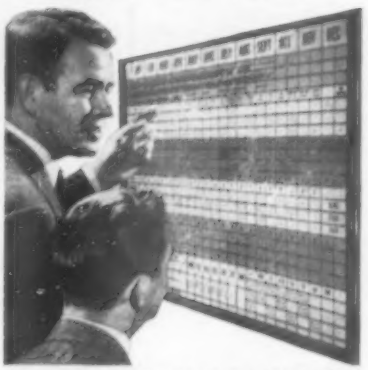
TOLEDO® *Headquarters for* **SCALES**

How To Get Things Done Better And Faster



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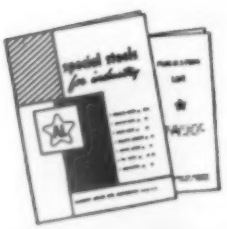

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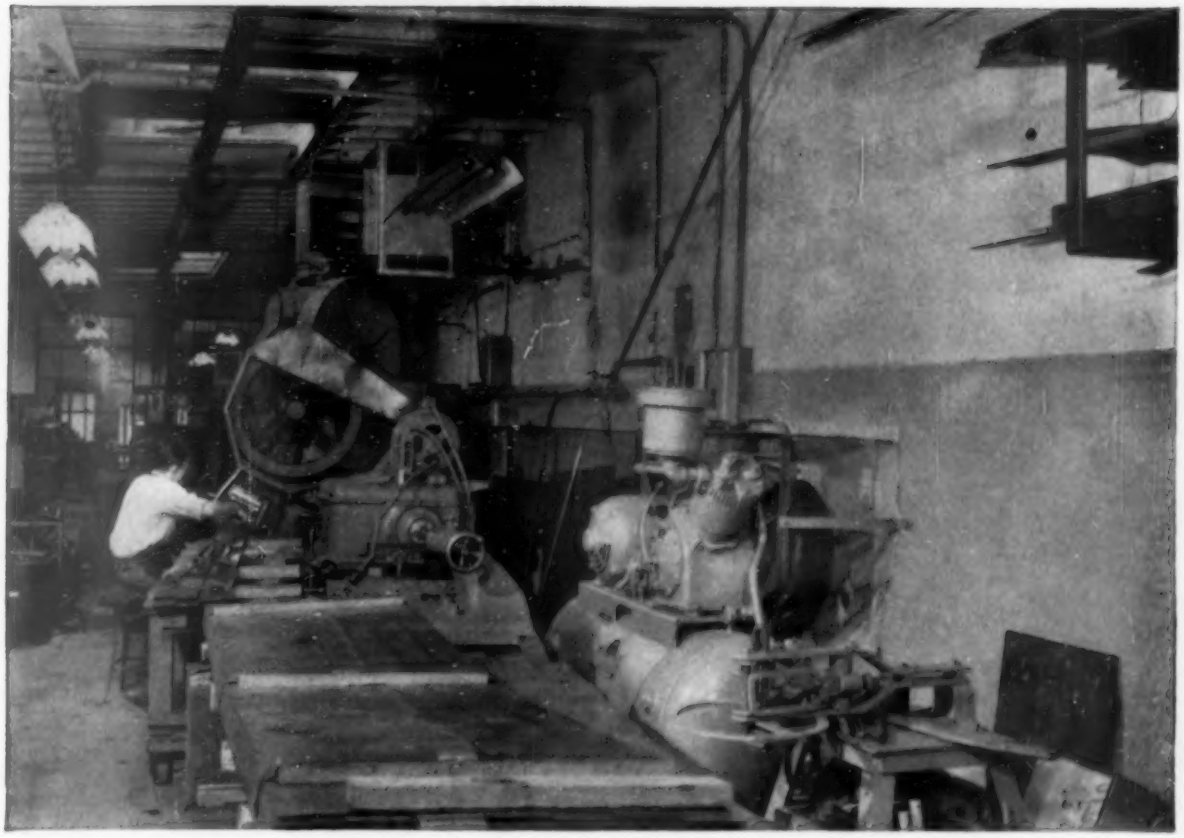

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That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

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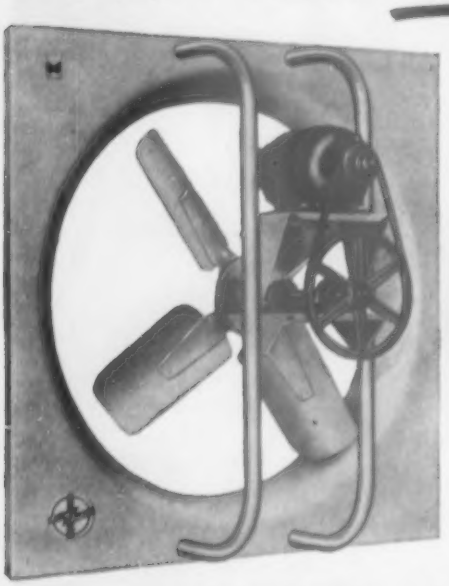
EXHAUSTS HOT DUSTY AIR FAST



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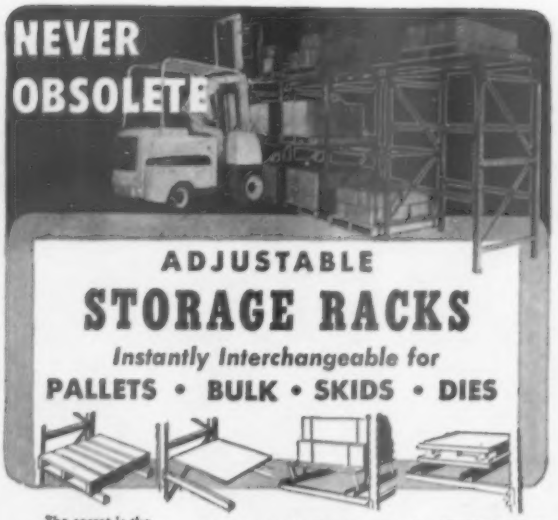

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STORAGE RACKS
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Patents pending

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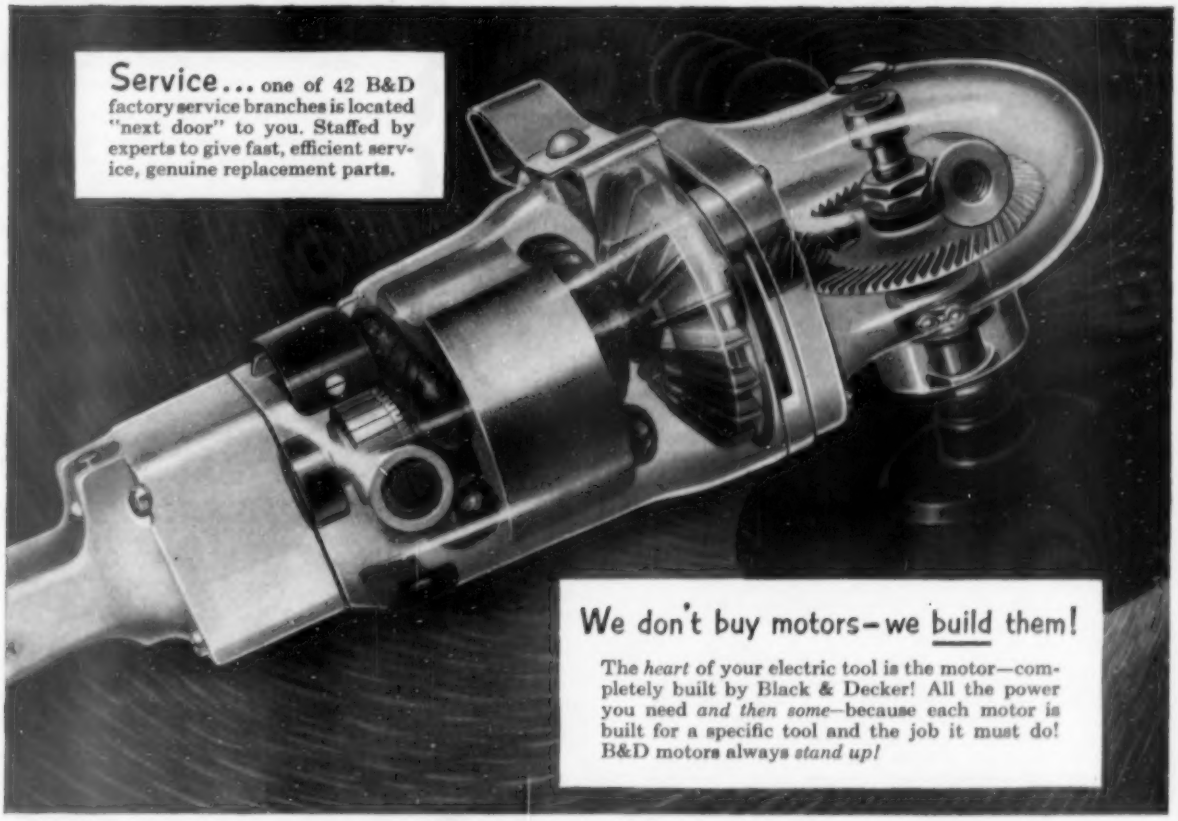
Service... one of 42 B&D factory service branches is located "next door" to you. Staffed by experts to give fast, efficient service, genuine replacement parts.
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B&D tools are *power-balanced* for greater speed, power and accuracy—which means faster, better production, lower costs. B&D tools, because of their lightweight and compact design, guarantee reduced operator fatigue. And B&D tools are *Power-Built* to last—like this B&D Sander, which is versatile enough for all your most exacting finishing jobs . . . sanding, grinding, burnishing, cleaning . . . stands up easily under 'round-the-clock operation—and will go on like this, cutting your costs, *for years!* See your B&D distributor today or write for free catalog to: THE BLACK & DECKER MANUFACTURING COMPANY, Dept. 1301, Towson 4, Maryland.

LOOK IN THE YELLOW PAGES UNDER "TOOLS-ELECTRIC"

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PORTABLE ELECTRIC TOOLS

TEAM SAVES 10 MEN, 300 HOURS IN LABOR COSTS AT NEWSPAPER

L. G. Prine, Building Manager
Lansing State Journal

"The Kent offset motor design cuts down operator fatigue, produces more and better work results per man hour of labor than any other method," says Building Manager L. G. Prine, of the Lansing Michigan State Journal.

Daily usage of Kent equipment has saved 300 hours per week or 10 men in the Journal building. Pictured above is the offset motor Kent floor machine being used for wet scrubbing with pickup by a companion vacuum.

Your maintenance problems may differ from the Lansing State Journal operation but Kent has the answer to cut costs for you. Kent's exclusive offset motor design allows up to 18.9% more cost savings than conventional center-mount machines besides cutting down on operator fatigue by minimizing torque and balancing handle weight.

Kent's motor is fully enclosed, *at no extra cost*—highly important where dampness or dust could hamper motor operation. Gears are cushioned by another Kent exclusive process to withstand starting shock.

If you have maintenance problems and want to save money, write us today. Our representative will gladly call.

Kent manufactures Commercial Vacuum Cleaners, Boiler Cleaners, and a complete line of Floor Maintenance Machines.

VACUUM CLEANERS — For wet or dry work, both the Quiet Triple Power (illustrated in photo at top of page) and the new Quiet Jumbo (above) have a special by-pass motor . . . no dust or moisture from vacuum stream can enter motor and cause damage. Two smaller sizes also available.

KENT

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Top view shows exclusive Kent "offset motor" design—Balanced Power!

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American Cancer Society

Scandinavia increases steam capacity, cuts costs burning coal the modern way

With its old power equipment overloaded by an ever-increasing demand for steam, Scandinavia Belting Co., Charlotte, N.C., took stock of its power situation. Boiler room efficiency was low and maintenance excessive; pressure fluctuated and labor costs had become a problem. Deciding to modernize, Scandinavia instituted a survey of all available fuels. On the basis of cost, coal was chosen. Today, after modernization, Scandinavia's power plant has increased steam capacity 150%, reduced fuel costs 15% and cut labor costs 70%. Increased efficiency and automatic operation have reduced the work force and assured a dependable steam supply at steady pressure with ample reserve for load growth. In addition, the cleanliness of the new plant has been an important factor in raising the morale of the employees.

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For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

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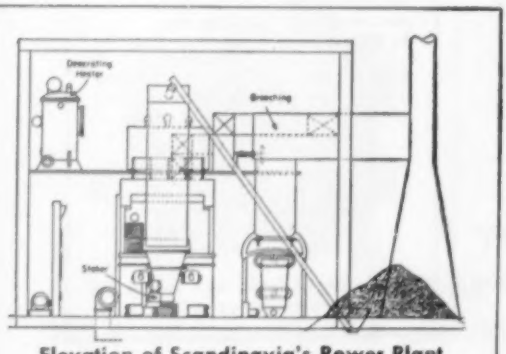
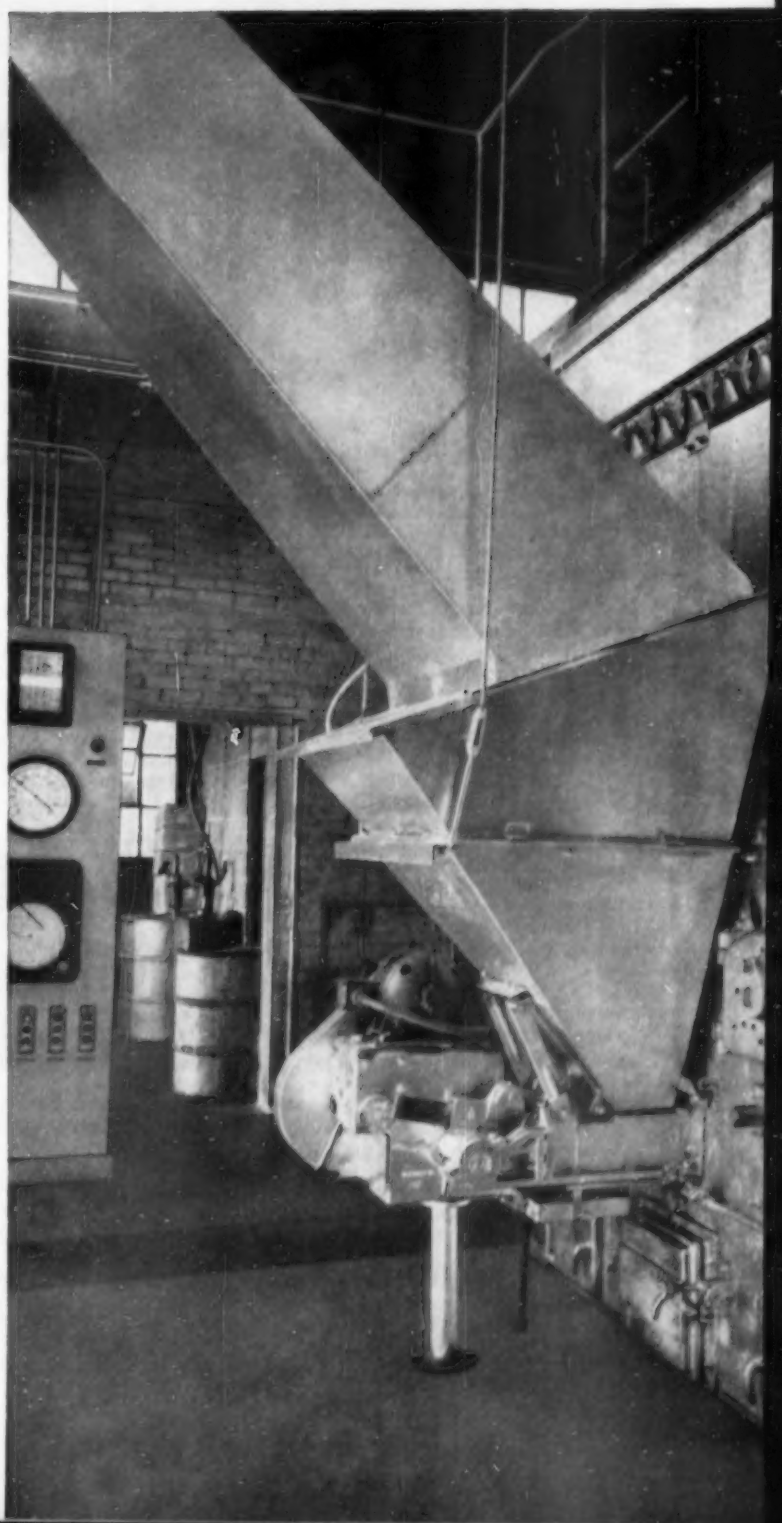
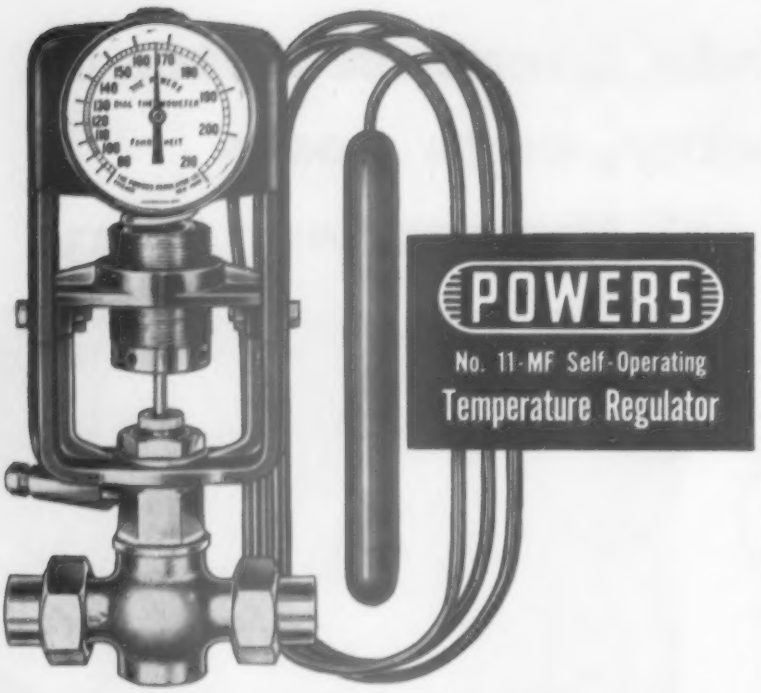
Southern Building, Washington 5, D.C.



Elevation of Scandinavia's Power Plant





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The subjects covered in these reprints are varied. Many of them you might wish to have for your own personal library. Others you may want to order in larger quantities for distribution to people in your organization. First come, first served. Write to: Editor, FACTORY

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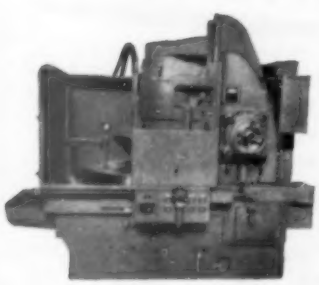

Send for free copies of "Work Done on the Blanchard", 4th edition, and "The Art of Blanchard Surface Grinding", 3rd edition—recently revised.

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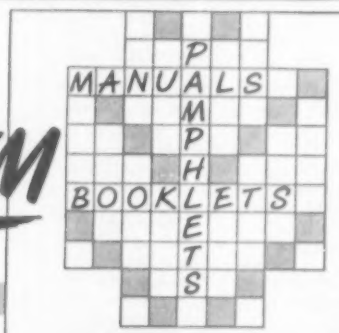

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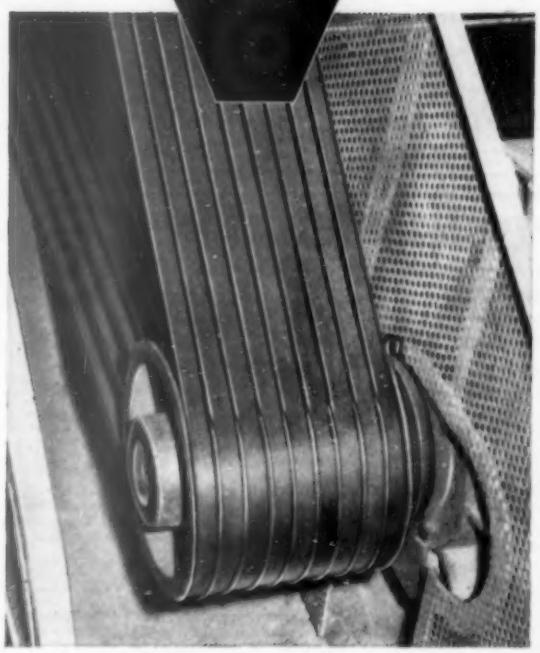

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Mill Sheave	20" p.d., 5C groove	5.375	64.08
V-Belts	5 standard C 144 "Matched Belts"		48.00
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INDUSTRIAL ENGINEER

Leading printer and binder offers you:

Opportunity

A permanent position in an expanding department. Our Industrial Engineering Department has always held a high level position in the Company. We enjoy harmonious working relationships with our 1600 employees.

Pleasant Living Conditions

Our plant is located in a growing central Indiana college town of 16,000. Here you can enjoy the benefits of living in a rural environment with large cities nearby.

Applicants must be graduate engineers. We are looking for young men with initiative and up to 5 years of industrial experience.

Submit personal resume to:

W. R. ISOM
Vice-President and Resident Manager
R. R. Donnelley & Sons Company
Crawfordsville, Indiana

ASSISTANT WORK MANAGER

To set up and supervise production lines and for general plant supervision. An experienced, capable engineer has a real future with this substantial, expanding firm of established reputation. Located in Southwestern city with unusual climatic advantages and recreational facilities. Resume will be held in strict confidence.

P-8592, FACTORY MANAGEMENT & MAINTENANCE
520 N. Michigan Ave., Chicago 11, Ill.

SEARCHLIGHT SECTION

Classified Advertising

BUSINESS OPPORTUNITIES — EQUIPMENT - USED or RESALE

UNDISPLAYED —***RATES***— ***DISPLAYED***

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DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

Send NEW ADVERTISEMENTS to N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. for February issue closing January 16th

—TRANSFORMERS—

BOUGHT AND SOLD

We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.

Custom-built transformers and coils manufactured to your specifications.

Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

THE ELECTRIC SERVICE CO., INC.
5321 Hetzel St. **Cincinnati 27, Ohio**
40 Years' Dependable Service

SQUARING SHEAR FOR SALE

Johnson, Model A-26, Serial No. 52601 hydraulic power squaring shear, 10 gauge capacity, 6 foot 4 inch length of cut, 18 inch throat depth, 24 inch back gauge range and 45 inch front gauge range. Equipped with 10 h.p., 1200 r.p.m., 3-phase, 60 cycle, 220-440 volt motor. New condition—used less than sixty days.

WELLS SPECIALTY, INC., North Liberty, Ind.

WANTED

Good used steel elevated water tanks—sell us your elevated tank, if no longer needed.

We Buy—Sell—Move—Erect—New—Used Steel Elevated Water Tanks and provide paint or repair maintenance for these structures.

UNIVERSAL CONSTRUCTION COMPANY
1129 Udell St., Indianapolis 21, Indiana

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SEARCHLIGHT SECTION
(Classified Advertising)
F. J. Eberle, Ass't. Mgr.

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Keith Alderson (above) is Traffic Co-ordinator for Sportsvision, Inc., in Hollywood. He says,

"I'm the Sunday morning quarterback!"

"When the final gun sounds on Saturday's football games," says Keith Alderson of Sportsvision films, "cameramen rush their film to us.

"By Sunday morning, we've got finished prints of Pacific Coast Conference games into the hands of the coaches. They call me their 'Sunday morning quarterback'!

"But that's the easy part of the job.

"By evening, we've edited all the games into three half-hour TV shows—Big Ten, PCC games, and the All American Game Of The Week. Out they go to 150 television stations for immediate showing.

"How do we do it? Air Express, across the board!

"Nobody else can meet our schedules. Yet Air Express saves us money! Austin, Texas, to Hollywood, for instance, costs $8.03 for 15 lbs. That's $1.68 less than the next lowest priced air service."

Air Express

GETS THERE FIRST via U.S. Scheduled Airlines

CALL AIR EXPRESS . . . division of RAILWAY EXPRESS AGENCY

HERE'S A HANDY POSTCARD THAT WILL HELP YOU—

GET MORE INFORMATION

How to use this Reader Service Card . . .

The bottom of this page is a postcard—you'll note that the page has been perforated so you can tear it out easily. This postcard makes it easy for you to get more information on anything that's advertised in FACTORY, or listed in FACTORY's *Catalog News, Equipment News,* and *Materials News Sections.*

Catalog News Section: Starts on page 138. FACTORY's Editors look at scores of catalogs each month, and select those that will be most helpful to you. In the Catalog News Section of the postcard, circle the numbers corresponding to the numbers of the catalogs you want. You'll get them—without obligation—direct from the manufacturer.

Equipment News Section: Starts on page 142. Here FACTORY's Editors describe various kinds of new equipment that will help you solve plant problems. In the Equipment News Section of the postcard, circle the numbers of the items you'd like to know more about. You'll get information direct from the manufacturer—without obligation.

Materials News Section: Starts on page 247. Out of the many new materials announced each month, FACTORY's Editors pick out those most useful to you. In the Materials News Section, circle the items you want to know more about. You'll hear direct from the manufacturer—no obligation.

Advertising Section: The postcard has numbers corresponding to the page numbers of the advertisements. Circle the page numbers of those you're interested in. Where more than one advertisement is on a page, the letters L, R, T, B indicate location: left, right, top, bottom.

Then be sure: Fill out your name, address, and other information in the space provided, tear out the card, drop it in the mail. The data requested will be forwarded to you shortly.

FACTORY: Send me more information about . . . **JANUARY 1956**

(Good until March 31, 1956)

. . . items in the CATALOG NEWS SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78										

. . . items in the EQUIPMENT NEWS SECTION as circled below:

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. . . items ADVERTISED on the pages circled below:

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236R	237	238	239	240L	240R	241	242T	242B	243	244	245	247	248	249	250T	250B	251	252L	252R	253	254
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TAKE ANOTHER LOOK...

...at the advertising in this FACTORY issue

...at FACTORY's Catalog News Section

...at FACTORY's Equipment News Section

...at FACTORY's Materials News Section

...and then circle on this handy postcard the items you want to know more about.

It's an easy way to get information on any subject you are interested in—you can build your own data file. And you can do it without cost.

Every month in FACTORY you can use this free service to get useful literature. And every month in FACTORY's advertising pages, leading manufacturers show you new ways, better ways to cut costs, boost production.

PLEASE PRINT

NAME .....

POSITION .....

COMPANY .....

ADDRESS .....

CITY & STATE .....

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed In The United States

4¢ — POSTAGE WILL BE PAID BY —

McGRAW-HILL PUBLISHING CO., Inc.
Reader Service Department

FACTORY Management & Maintenance

330 WEST 42nd STREET

NEW YORK 36, N. Y.

Here's Why We Specify
SQUARE D Starters
on the Machinery We Buy

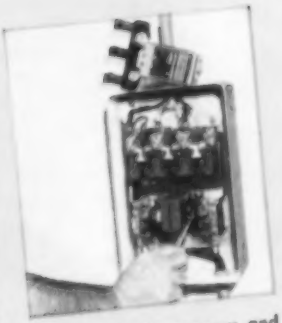
PERFORMANCE, EASY INSPECTION AND MAINTENANCE

Sure, we like Square D performance because it keeps our "down time" at a minimum. BUT—everybody knows that even the best starter needs periodic inspection and preventive maintenance. We like the way Square D makes it easy to handle those routine jobs.

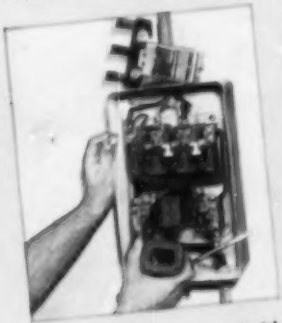
OFF-THE-SHELF PARTS KITS

They make normal maintenance and modifications easier than ever. Packaged parts include interlocks, contacts, coils, overload relays, pushbuttons and selector switches. They're easy to buy, easy to identify, and faster to install.

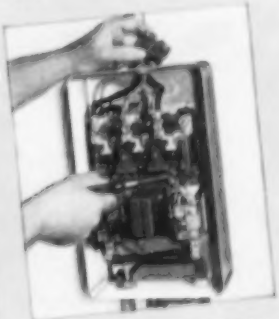
1 Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.



2 Remove four screws and entire movable assembly can be lifted off. Disconnect two wires and slip off magnet coil.



3 Contacts are attached with separate screws—they can be removed and replaced without disturbing any wiring. A screwdriver is the only tool needed.



4 Sizes 0 through 4 starters have these separate mounting electrical interlocks for easier installation. Contact block is attached from front of panel with two screws.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

How high load capacity is built into less space in Dodge-TIMKEN All-Steel pillow block

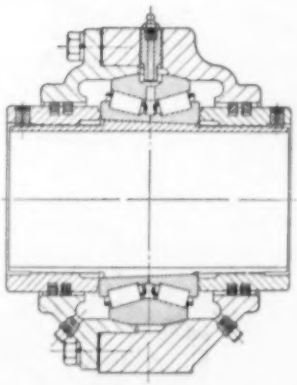
THIS rugged Dodge-Timken pillow block packs more capacity in less space than ever before. All-steel construction gives it extra strength and durability. The design is compact. No special thrust devices that take up extra space are needed—the two-row Timken® tapered roller bearing takes *both* radial and thrust loads in any combination. And full line contact between the rollers and races assures high load capacity.

The cutaway view below shows the bearing. It is of special design, with tapered bore and self-aligning spherical outer surface—never requires adjustment. As in all Timken bearings, races and rollers are case-carburized and have tough, shock-resistant cores under hard, wear-resistant surfaces. Under normal conditions, the Timken bearing will last the life of the machinery with which the pillow block is used.

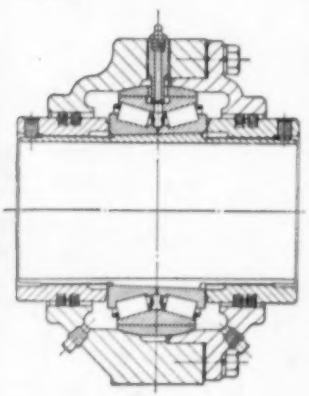
In addition to the all-steel pillow block shown here, Timken bearings are also used in the Type "E", Double-Interlock, Type "C", and Special-Duty pillow blocks—other versatile pillow blocks in the Dodge-Timken line with a wide variety of uses in industry.

To be sure of the finest bearing steel, we make our own—America's only bearing manufacturer that does. No other bearings can give you all the advantages you get with Timken bearings. Include them in your design plans... specify them for the machines you buy or build. Look for the trademark "Timken"—it's on the bearing that makes any machine run better. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **DODGE MANUFACTURING CORPORATION,** Mishawaka, Ind., mounts Timken bearings in the Dodge-Timken All-Steel pillow block. Above: non-expansion block with fixed bearing. Below: expansion block with floating bearing.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◖ AND THRUST ⊣◯⊢ LOADS OR ANY COMBINATION ✳